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Assessing the short-term impact of pension reforms on older workers' participation rates in the EU: a diff-in-diff approach

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1. Introduction

The performance of the European labour markets improved significantly during the second half of the 1990s (AER 2003). After having reached a peak in 1994, the unemployment rate started gradually to decline while both the employment and the participation rates kept rising. With increases of more than 8 and 7 percentage points, respectively for the employment and the participation rates, the female and the older workers were the most dynamic components. These improvements reflect long-term changes in the socio-economic behaviour such as a different attitude toward female employment and participation, improved health and working conditions which induce to retire at older ages. Yet, they took place in response to the reforms implemented during the period (e.g. ECB, 2007). The last decade witnessed important changes in European pension systems. Up to 1995, only few countries implemented pension reforms. By 2006, almost every European country had enacted reforms of the pension system. This richness of reforms across countries and time of their occurrence can be used to conduct a "policy experiment" of the effects of pension reforms on the participation rates of people aged between 50 and 64 years. Each policy intervention is considered as a discrete event that occurred at a specific time for each country. The event-study compares the value of one variable of interest after a certain reform or legislation has taken place with its value before such change has occurred. To control for other determinants not related to specific policy interventions, the findings of before-after comparison are compared with a control group made of those countries which did not implement a reform at least in one year covered by the sample period. With the event-study approach we will verify

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whether after pension reforms the participation rate rises.[1] Thus, we analyse the impact of pension reforms on participation rates of different age/sex groups of elderly workers by contrasting changes in participation rates in reforming vs non-refroming countries.

The paper is organised as follows. Section 2 presents the main stylised facts. Section 3 briefly reviews the main theoretical explanations of the observed trends in participation, while section 4 discusses the effects of pension reforms on the average retirement age. Section 5 gives an overview of the reforms undertaken in the EU between 1997 and 2007. Section 6 presents the empirical finding of the effects of recently introduced pension reforms on the older workers' activity rates. Section 7 discusses the policy implications and possible follow up.

2. Stylised facts: main developments in older workers' participation rates

Life expectancy has significantly increased in developed countries, mainly thanks to improved living standards, working conditions and health care. In the early 1980s the average life expectancy stood at around 75 years to reach 80 in 2006; for few new Member States it hovered around the EU average of 26 years earlier. (Table 4).

Work has become less physically demanding, population much healthier and long-lived. Even so, as documented, among others, by Palmer (1999), Samwick (2002), and Boeri et al (2001), there has been a significant decline in the participation rate of elderly people, which reversed its negative trend only in recent years. The dramatic difference in the time pattern across men and women (Graph 1) often gets unnoticed. For several countries, the activity rate of men aged between 55 and 64 appears often U shaped, with decline in participation at least until the mid 1990s. For the 50-54 age group, rates appear more stable and the decline relatively more limited; there are significant exceptions to this pattern such as. the participation rates of Belgian and Italian men aged 50-54, rapidly converging to the highest rates. Despite country specific labour force histories, the broad trend of a shrinking labour supply of male aged 50+ remains. Thus, even though men live longer than before, they leave the labour market earlier.

Conversely, women, especially those aged less then 60, have a steadily rising participation, and it is not rare to find countries where female rates almost doubled in 10 years only. The change over time in the age profile of the participation rates confirms that the major modifications in the participation behaviour occurred in the case of women, at age below 59, and especially in their early 50s. Without these modifications, several countries would have had in 2007 activity rates

[1] The event-study method has been applied to study market response to changes in the law, both as a result of court

hovering around the level of twenty years earlier. As a consequence of these differentiated patterns in the participation rates by sex, the average age at which people retire has changed only to a minor extent (Table 5).

Graph 2 displays the age profile of the exit rate from the labour market for selected countries for the mid 80s, the early 1990s and the first half of 2000s. This rate is calculated as the conditional probability of an age cohort of not staying in the labour market at age h.[2] Spikes can be observed at about the statutory retirement age for all countries and, for some, at the age of early retirement. There is also a clear difference in the exit rates by sex which reflects different statutory retirement ages of men and women. Finally, there are recently significant changes in the age profile of the exit rates in the recent years. The probability of leaving the labour market at ages just below 60 falls for both sexes in several countries. Even so, at the age of 60 there is a significant increase in the probability of withdrawing from the labour market. Early exit from the labour market remains high in Belgium, Germany, France, Italy and the Netherlands.

The patterns briefly described are the outcome of complex individual participation decisions which are influenced by a variety of factors, including *social factors*, such as longer schooling or change in the role of women in households; *demographic factors*, including the decline of fertility rates and modifications of the age structure; *institutional factors*, such as changes in the financial incentives to retire early, in the eligibility conditions or in the availability of alternative early retirement paths, (e.g. temporary access to disability and unemployment benefits before being granted retirement benefits, Van Ours, 2006 for the Netherlands). Early- or pre-retirement programmes were commonly used in the 70s and 80s to deal with industrial restructuring (Brugiavini, 2001), high unemployment of older workers, low employment of young workers, or as a labour cost saving strategies. Economic factors, such as the level of the unemployment rate, the average income by household, the share of part-time employment in total employment or the share of the services sector in the economy have also been invoked to explain the differences in the participation rates across countries and over time.

3. What explains the main trends

Many economists have tried to solve the puzzle of higher life expectancy, less physically demanding work and lower retirement ages. Two major factors have caused declining participation rates of older workers (Diamond, 2005).

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decisions and legislative reforms.

[2] In symbols if PR(h,t) is the participation rate at time t of cohort h, the exit rate is defined as 1-PR(h,t)/PR(h-1,t-1).

First, due to positive trend in real earnings, both the fraction of lifetime spent working dropped. As the income effect from higher real earnings prevails on the substitution effect, higher real incomes allows more hours for leisure, higher consumption and savings despite falling working time. Thus, the increase in real wages has been the main determinant of the long-term decline in the retirement age in industrialised countries (Bloom, Canning and Moore, 2007).

The increase in the lifespan has also produced a wealth effect because of the influence of compound interest and wage growth, which reduce the proportion of life devoted to work. Second, the rules establishing access to pension, public health and long-term care may have influenced the individual decision to retire. As life expectancy increases it would be optimal to postpone retirement age. However, the existence of social security programs translate into higher savings and earlier labour market exits (e.g. Bloom, Canning, Mansfield and Moore, 2006 for a life-cycle model of the labour supply with endogenous retirement age and the social security arrangement). Similarly, in a model with stochastic ageing among three age classes and accumulation of human capital with two skill levels, Ljiungqvist (2007) shows that the non-employment effect of taxation do not differ in complete and incomplete markets, with the tax and benefit system affecting non-employment of low and high skilled respectively in complete and incomplete markets.[3] Using a panel for 12 countries, Gruber and Wise (2002) demonstrate several disincentives for continued work for the elderly built in national social security schemes. Many have noticed high exit rates at the first age at which one can retire and at the statutory retirement age (e.g. Coile and Gruber, 2000 or Samwick, 1998). More generally, individuals able to set aside enough funds are those that firstly retire, especially when they are allowed to use benefits to "top-off" their retirement wealth.

Early retirement schemes can be characterised by several adverse mainly long-term effects (Conde-Ruiz and Galasso, 2004). They can influence negatively the accumulation of human capital of less-skilled workers, lower economic growth, and increase the dependency ratio and the risks of financial imbalances when population ages. Using an overlapping generation model with heterogeneous agents extended by voting, Conde-Ruiz and Galasso demonstrate why alternative policies had not been realised even though they would have had less distortive impact upon the economy. Their analysis provides a political economy explanation of the early retirement schemes.

[3] With incomplete markets fiscal policy impacts employment outcomes via the optimal allocation of individual wealth. As tax rates increase, skilled people can put aside enough funds to finance early retirement. At successively high rates, the low skilled will start to save up for early retirement.

4. Pension reforms and average retirement age

If expected income falls or life expectancy increases unexpectedly, a worker realises that his/her planning horizon is extended and previous plans concerning the rest of his/her life should be reassessed. Economic theory proposes three ways how to set up a new optimal plan. First, a worker could reduce consumption during pre-retirement age and accumulate savings for later stages of life. Second, a worker could reduce consumption spending during retirement age and deplete lifetime savings more slowly. Third, a worker could decide to work longer to reach the initial level of consumption. In addition, when there is only one earner in the family, the fall in his or her expected income during retirement may induce the second earner to enter into the labour market to keep unchanged the family consumption.[4] The final impact on the participation rate depends on how these effects influence the retirement decision.

Within a life-cycle framework, the retirement decision is a function of the lifetime streams of earning, pensions and other sources of income (Mitchell and Fields 1981). Obviously rational agents chose their optimal consumption pattern jointly with the amount of work they wish to supply during their lifetime and the time at which they wish stop working. In a standard competitive model with social security, taxes and benefits have distortionary effects on individual consumption, savings and optimal retirement age (e.g. Seshinski, 1977). Thus, compared to an economy with no benefits, social security benefits imply in equilibrium lower consumption and lower retirement age. In the *option value* model (Stock and Wise, 1990), the work/retirement decision is associated to the option of *continued work keeping the option to retire at a later stage*. If the expected value of working is worth more than the expected value of retiring, the individual continues to work. If there are no expected gains from continued work, he would retire. In this framework, changes in the pension system such as changes in the coverage rate, in the accrual of retirement wealth attributable to continued work, more than the level of retirement wealth at a given point in time, are found to influence the average retirement age (Samwick, 1998).

According to the simulations of Gruber and Wise (2002), a reform that delays benefit eligibility by three years would likely reduce the proportion of men aged between 56 to 65 out of the labour force between 23 to 36%.

Mitchell and Fields (1983) apply an ordered logit model to estimate the impact on the average retirement age of changes in the expected income. Not surprisingly they find a negative impact of

[4]The so-called "added worker" effect implies an increase in the participation rates when the expected income of the family deteriorates (Pissarides 2000).

a rise in social security streams on the average retirement age. The impact of a 10% increase in the social security benefits was estimated to reduce a retirement age by -0.07 years for all individuals without any restriction on age. In case of individuals at the age of 60 the effect is more pronounced when reducing the average retirement age by -0.19 years.

Bottazzi, Jappelli and Padula (2006) estimate - separately for males and females - the impact of the Italian pension reform on the expected retirement age, omitting the transitional 1993-1997 period of the reform. While their regressions indicate that the patterns found for women are the same as for men, still the effect on women is somewhat larger. The estimated impact on the expected retirement age is about 0.7 years for both male and female private sector worker. In case of public employee and self employed the effect is even higher reaching values over 1 and 2 years respectively.

Some EU countries have switched from defined benefit to defined contribution pension systems or at least introduced one pension pillar based on this assumption. Such change may lead people to stay longer in the labour market and, therefore, is expected to increase the average retirement age. Friedberg and Webb (2005) support this hypothesis by estimating that employees with defined contribution plans usually retire one or two years later compared to employees with defined benefit plan. Furthermore, Diamond (2005) argues in favour of pension systems with low implicit tax on continued work after the age at which retirement benefits can first be claimed. Usually low implicit taxes are ensured with a defined contribution system.

Palmer (1999) proposes a notional defined contribution pay-as-you-go system. As usual in prevailing pay-as-you-go systems, working people contribute to the system providing resources for contemporary pensioners. However, differently from the DB system, the more people contribute to system the higher is their future pension. Finally, the rate of return is not affected by the developments of the financial markets, but by the overall performance of the economy. So, the system should stimulate people to postpone their exit from the labour market and, in passing, to its financial stability.

Bloom, Canning and Moore (2007) show that the optimal response to dealing with the solvency problems that arise in social security when life expectancy increases is to reduce contributions and increase benefit rates, maintaining solvency exclusively by increasing the retirement age. This response can maintain solvency because raising wages over time and compound interest on accumulated savings mean that longer working lives tend to create more than proportional wealth at retirement.

The retirement age has stabilised and recently partially reversed its declining trend. Again, several factors have to be taken into account. First, under the pressure of ageing and the medium- to long-term risks for the financial sustainability of social security systems, several member states have enacted reforms of the pension systems that have tightened the eligibility conditions for pension benefits (e.g. minimum years of contributions, retirement age) and reduced their generosity. Second, some reforms have shifted part of the financial risks from state to employers and employees. Thus, longer life expectancy and less generous pension benefits may have induced workers to work longer to accumulate precautionary savings for their old age (i.e. they have made the income effect prevail over the substitution effect). The next section reviews more in depth the pension reforms enacted in the member states in the last decade.

5. Overview of early retirement and pension reforms undertaken in the EU over the 1997-2007 period[5]

Reaching low levels of inactivity among older workers and promoting longer working lives are key factors to alleviate the negative impact of population ageing on employment and economic growth (European Commission-EPC 2009 Aging report). The 2001 Stockholm European Council stressed the importance of reforms encouraging higher employment and participation rates, especially among women and the elderly; it emphasised that pension reforms are needed to ensure both the long-term financial sustainability and a certain degree of intergenerational fairness.

In response to pressures stemming from ageing populations and persisting low participation rates, all countries of the EU have reformed their pension systems. These reforms comprise a number of different measures (Table 6 and Table 7) that were meant to keep the sustainability of public finances mainly by transferring part of the demographic risk from the state to individuals and by giving strong incentives for working longer.

A widely accepted distinction is between parametric and systemic reforms. Parametric are those reforms which involve adjustments to the parameters of defined benefit (DB) and pay-as-you-go

[5] This section briefly describes the main elements of the reform strategies adopted in the EU27 over the period 1997-2007. Information on pension reforms adopted in the EU27 in the years 2000 to 2007 is taken from the LABREF database (http://ec.europa.eu/economy_finance/db_indicators/db_indicators8638_en.htm). For reforms enacted during the Nineties in the EU15, we used the Fondazione Rodolfo De Benedetti database, available at: http://www.frdb.org. Concerning Bulgaria and Romania, for the time being LABREF only covers the years 2003 to 2007. Missing information was mainly obtained from Disney, R. (2003), "Public Pension Reforms in Europe: Policies, Prospects and Evaluation", a number of ILO and ISSA papers, as well as the Joint Reports on Social Protection and Social Inclusion, 2007 and 2008 editions, and the Synthesis report on adequate and sustainable pensions 2006, all available at: http://ec.europa.eu/employment_social/spsi/index_en.htm.

(PAYG) public pension systems, without changing their financing mechanisms. Systemic reforms move away from the PAYG DB- system and adopt a DC-type personalised accounts system - thus linking more strictly pension contributions to pension benefits.[6]

The majority of pension reforms adopted in last ten years were parametric, mainly strengthening the links between contributions and benefits (notably by extending the period over which earnings are taken into account for benefits' calculation) and stricter conditions for eligibility to first pillar defined-benefit pension schemes (notably through higher retirement ages). For example, the reference contribution period and wages used for the calculation of old-age pensions were extended in Finland in 2003; the annual pension accrual rates were also modified to discourage early exits from the labour market and to financially reward long working careers; it was also decided that starting from 2009 pensions would begin to reflect changes in average life expectancy. [7] In Finland and Sweden, greater flexibility was given to older workers to decide their retirement age (abolition of the general retirement age at 65). In Austria, the 2003 pension reform raised the retirement age to 65 for men (60 for women) starting from 2017, extended the assessment period for pension calculation gradually from 15 to 40 years and gradually reduced the accrual rate.[8] Finally, the reform of the public old age pension scheme introduced in Portugal in 2000 increased to 40 years the contribution period for a full pension for the private sector[9]. Other measures included changes in the taxation of contributions and benefits, or in the pension coverage, as well as the setting-up and development of mandatory and/or voluntary second- and third-tier pension schemes.

Almost all countries increased the statutory retirement age, the majority opting for a smooth transition towards higher retirement ages (Table 8). The age of eligibility to a state pension was

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[6] The distinction between parametric and systemic reforms is largely used by the international academic community, notably the IMF and the OECD (see for instance "Pensions at glance", OECD, June 2007). The key parameters of DB pension schemes can be grouped into: income measures (ceiling or other restrictions on pensionable earnings; number of past salaries included in the calculation of the pension; revalorization mechanism for past salaries); eligibility conditions (statutory retirement age, minimum retirement age (for early retirement), minimum vesting period, contribution rate); benefit formula; (accrual rate; "reduction factors" for retirement prior or after the statutory retirement age; maximum replacement rates and/or pensions; minimum replacement rates and/or pensions; indexation mechanism for pensions). The main difference between DB and DC pension schemes lies in the sharing of risks for longevity between the current generation and future ones - i.e. the shift to DC structure in systematic reforms implies greater risks for individuals.

[7] Germany, Finland and France introduced part-time work before the standard retirement age. In Sweden, individuals can continue working, taking a part-time pension and accrue additional unlimited pension rights. Gradual retirement was introduced in Luxembourg for the employees agreeing to switch from full-time to part-time work.

[8] One year later, the 2004 reform redesigned the calculation of pension benefits leading to a much stronger link between contributions and benefits, including a bonus/malus system for deferred/early retirement, and introduced a uniform pension law for all professions.

progressively increased from 65 to 67 in Denmark, Sweden and Germany, in the latter with a very long phasing-in period. In the UK, the earliest age to take a pension was raised from 50 to 55 in 2004 and a default retirement age was fixed at 65 in 2005, with unjustified retirement ages below 65 years being prohibited. The retirement age was also progressively increased in the Czech Republic (2003) up to 63 years for men and childless women (women get one-year bonus per child varying between 59 and 62 years), in Hungary (1997) up to 62, Slovenia (1999) and Romania (2000). In Cyprus, the retirement age for civil servants was increased from 60 to 63, the same as in the private sector (where retirement ages range between 63 and 65). In Portugal it was raised from 60 to 65. The age at which women can receive a first pillar pension was equalised with men's age in most countries.

Pension reforms involved a systemic change in the financing of the insurance system in few cases only, notably leading to the conversion of pre-existing DB first pillars into notional defined contribution (NDC) public pension schemes (e.g. PL, SE),[10] or to the introduction of statutory funded pension schemes (e.g. HU, EE, LV, SK). Some countries (HU, SE, PL, LV, EE, LT and SK) switched part of the public defined-benefit pension system into funded defined-contribution schemes, where the pension depends on contributions and interest earned on them.

Systemic reforms were also introduced in countries that established state-supported second and third-pillar voluntary funded pension schemes, supplementing a gradual reduction of first-pillar pension levels (Germany in 2000) or promoted third pillar pension funds based on employees' own savings (France in 2003). Several countries encouraged supplementary pension schemes either through tax incentives or adjusting contribution rates in the direction of private and occupational schemes (e.g. HU, DE, NL) so as to promote the development of privately-managed, fully-funded occupational pensions. Similarly, the automatic transfer of the end-of-service allowance to occupational pension funds was decided in Italy in 2004.

The changes introduced In several countries were rather incremental building upon previous reforms dating in some cases from the early Nineties (e.g. Italy). Reforms generally involved the establishment of stronger actuarial links between benefits and contributions - mainly through

[9] In 2005, it was extended to employees in the public sector. The benefit formula was again significantly changed in 2007.

[10] In Poland, pre-existing defined-benefit PAYG pension scheme was replaced in 1999 by a three pillar system including a notional defined-contribution (NDC) first pillar linking contributions to future pensions, a second pillar that capitalises individual contributions and is mandatory for the younger generations, and a voluntary third pillar based on company plans or other savings vehicles.[10] Following the shift of the public pension pillar from defined benefit to notional defined-contribution accounts, the pension benefits depend on contributions made, but the notional interest rate is set by government and the schemes remain pay-as-you go financed. Similar reforms were passed also in Sweden (1999), Latvia (1996) and Italy (1993, with very long implementation schedule).

longer contribution periods required for a full pension - and increased incentives for workers to retire later, notably by means of actuarial reductions for early pensions and increases in pension rights for deferred retirement.

With few exceptions (e.g. Slovakia), the major reforms in the new Member States were legislated in the 1990s (for instance, Poland, Estonia, Latvia, Lithuania and Slovenia). In some EU10 countries, recent reforms have increased the generosity of the system, for instance by introducing new early retirement schemes where they did not exist any more (e.g. in Lithuania, where the early retirement scheme was abolished in 1995 and re-introduced in 2004 for the long-term unemployed, the Czech Republic, where a new early-retirement programme in the steel industry was introduced in 2000) or by reinforcing them (e.g. in Hungary), to help absorb the shocks of ongoing employment restructuring and economic change.

To take better account of future demographic changes, a significant number of countries introduced a demographic adjustment in their first pillar pension formula linking pensions to changes in average life expectancy. This is a common feature of all countries having introduced systemic reforms, where pensions will in future automatically adjust to changes in life expectancy, but similar adjustment mechanisms have also been built into systems which have not undergone systemic reforms (e.g. with the reforms of 2003 and 2004 in France and Germany. Similar provisions have been introduced in DK, FR, AT, FI, LV, LT and, more recently, in PT (2007).

Discouraging early retirement...

Early retirement benefits, which vary by country and usually by professional group depending on the nature of work, is the main reason for early exits from the labour market. They are often used as an instrument of employment policy, to artificially lower the unemployment rate of the elderly.

Reducing the generosity of early retirement pensions was a key component of all pension reform. To discourage early exits from the labour force, Member States have abolished early retirement schemes, substantially reduced their generosity and introduced bonuses in case of postponement of retirement for those extending their working lives (Table 8).

For example as part of the 1999 pension reform, in Poland the "pre-retirement allowance" was discontinued in 2001, while the eligibility conditions for obtaining "pre-retirement benefits" were made more stringent in 2004.[11] A comprehensive reform of the pre-retirement pension system

[11] Both schemes had been introduced in 1994 to accompany employment restructuring in the waning branches and outdated sectors of national economy.

was approved in France in 2003[12]. In Finland (2003-2004), the qualifying age for early old age pension was raised to 62 and the individual early retirement, available to people with reduced working capacity aged 60 to 64, was phased-out. The early retirement pension for older long-term unemployed will be abolished in 2009[13]. Some early retirement schemes were suspended and abrogated in Portugal in 2005[14] and the conditions for accessing early retirement tightened in Czech Republic and Spain (2006). Germany, Hungary, Slovakia (2006) and Portugal (2007) cut early retirement benefits, raised the minimum contributory period to be eligible for an old-age pension and tightened the access to schemes open to unemployed. In Latvia, the possibility to early retire was abolished in 2008. The early retirement age was gradually raised in Austria in 2003, and the possibilities for early retirement will be phased out by 2017. In Germany (2004), the minimum entry age for early retirement on account of unemployment was increased from 60 to 63. The earliest age at which a private or occupational pension can be taken was also raised in those countries where this has an impact on the effective labour market exit age (e.g. UK, IRL). In Sweden (2000), early retired people were allowed to return to work while the tax advantages for early retirement were abolished in the Netherlands.

Working beyond the official retirement age was supported in many countries for instance with higher accrual factors – e.g. CZ, EE, LU, DE, EL, HU, PT, SI - or with the introduction of supplements for deferred public old-age pension (e.g. DK). Partial retirement was introduced in Germany (2001) and the UK (2004) and gradual retirement in France (2006). In this country, a new form of fixed-term contract for job seekers aged 57 or more was introduced in 2006, while the so-called 'Deladande Contribution' - a tax to be paid by companies dismissing employees aged 50 years and over - was gradually phased-out to improve the employability of older workers[15]. Incentive schemes for workers who decide to remain in the labour market after the official retirement age were decided in Italy, France, Spain and the UK.

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[12] The 2003 reform, which was embedded in the pension package known as the 'Raffarin Act', included limiting fiscal incentives for pre-retirement schemes to physically demanding jobs and restructuring firms in financial distress; eliminating progressive early retirement; increasing the cost of company early-retirement schemes, placing restrictions on state-financed early retirement. Even so, employers may still require employees who have the right to a full pension to retire between the ages of 60 and 65 if the worker is covered by an early retirement scheme put in place before the reform came into force or if an extended sector-level collective agreement, providing for compensatory measures for such retirement, was reached before 1 January 2008. A number of sectors have taken advantage of this option for maintaining retirement before the age of 65.

[13] If people become unemployed at the age of 57, they will be entitled to the income-related daily unemployment allowance until the age of 65 if they have worked for five years during the previous 15. Those born before 1950 will be entitled to a daily unemployment allowance from the age of 55 until the age of 60; thereafter, early retirement and then full retirement will be still possible.

[14] Previously, workers in Portugal could qualify for early retirement benefits either at age 55 with 30 years of contributions or at age 58 if they were unemployed.

[15] The Deladande Contribution was introduced in 1987 to compensate for the removal of the administrative authorisation of redundancy but in practice obstructed the recruitment of people aged 50 years and older and

6. An empirical evaluation of the effect of pension reforms on the older workers' participation rates in the short-term

The OECD has conducted an extensive research on the impact of policies and institutions on employment and unemployment in the OECD countries.[16] This work showed that high implicit taxes on continued work deter older workers from remaining in the labour market, while high statutory retirement ages have the opposite effect.[17] The characteristics of the old age-age public pension systems (e.g. standard retirement age, accrual rates) and other forms of income support (early retirement schemes) are found as the main determinants of the differences in the 55-64 participation rates across countries and over time (Blondall and Scarpetta, 1998; Duval, 2003).

In this section we verify the impact of pension reforms on the participation rates of specific groups of older workers with a difference-in-difference approach. This approach requires the identification of a specific policy intervention against which one should compare the difference in outcomes before and after intervention for a treatment and a control group. A source of spatial and temporal policy variation in the reforms carried out is necessary to estimate this effect.

We exploit the information available from LABREF and other sources (e.g. FRDB, MISSOC etc) to identify a chronology of reforms.[18] Reforms are classified in three categories. First, fundamental reforms are those systemic reforms that imply a change from defined benefits to notional defined contribution first pillar pension schemes or that transfer public pension savings partly to private funded schemes. To this category belong parametric reforms that entail a change in the eligibility conditions (e.g. statutory retirement age, years of contributions). These reforms are usually gradually phased in and imply long implementation lags. Second, measures that do not modify financing or eligibility conditions are deemed as non fundamental, namely those

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transferred possible redundancies to employees who were soon to reach 50 years of age. The contribution will be phased out completely in 2010.

[16] Bassanini, A. and R. Duval (2006), "Employment Patterns in OECD Countries: Reassessing the Role of Policies and Institutions", *OECD Economics Department Working Papers*, No. 486, OECD Publishing

[17] A 10 percentage points cut in the implicit tax and a one-year increase in the standard retirement age are estimated to raise the employment rate of older workers by 1 and 0.6 percentage points, respectively.

[18] *LABREF* provides information on reforms enacted in various years by the 27 Member States. It is an inventory of labour market reforms jointly managed by DG ECFIN and the Economic Policy Committee. It is conceived as a tool to provide comprehensive description of qualitative features of the reform process, including the design of enacted reforms, their scope and durability. To date, the database covers the years 2000-2006 for the EU27. Information for the year 2007 will be made available to the public in April 2008. The database can be freely accessed at: http://europa.eu.int/comm/economy_finance/indicators/labref_en.htm. For a description of LABREF see *European Economy Research Letter* Vol. 1, issue 3 November 2007. As regards pension reforms LABREF provides information distinguishing policy measures in the area of Disability benefits, Early retirement schemes, Contributions , Coverage, Eligibility conditions, Level and tax treatment of pension reforms. For the years 2000-2006, the chronology of pension reforms is taken from LABREF. For the previous years the information draws on different sources (e.g. EIRO, MISSOC, NATLEX).

modifying the tax regime of contributions and pension benefits, indexation rules, or introducing second and/or third pension pillar gradually and on a voluntary basis. The third group gathers all measures implying phasing-out of early retirement schemes.

Graph 3 displays the cumulated number of fundamental, non-fundamental pension and early retirement reforms for the period 1990-2006. Three things emerge. First, an increasing number of countries introduced reforms that changed the philosophy of the system (fundamental reforms). As of 2006 nearly every European country, especially of the EMU (Table 6), had reformed its pension system. Second, starting from 2000, non-fundamental reforms are more frequent than fundamental or early retirement reforms. Third, early retirement reforms rare in the 1990s became more frequent in the early 2000s.

This rich variation in policies across countries and over time can be exploited to assess their effect on the older workers' participation rates. Each measure is considered a discrete event which occurred at a specific point time for each country. The value of a variable of interest after certain legislation has taken place is compared to its value before such a change occurred. To control for factors unrelated to specific policy intervention, the before-after comparison is evaluated against the average of a control group.

In the period under consideration almost all countries undertook a pension reform. The quasi-natural experiment framework requires that pension reforms are a source of exogenous variation with respect to shocks to the participation rates. Consistently with the common belief (Peerson and Svenson), we assume that the main motivation for governments to undertake a pension reform is to achieve financial sustainability of social security rather than to offset trends in participation rates and in the retirement age.

Our sample covers 27 countries over the period 1990-2006.[19] To define our treatment group we identify as reform year the year in which a reform is enacted. When reforms of the same type are passed in two consecutive years we treat them as a single event; the average participation rate is taken as representative of the participation rate at the time of the reform. Similarly, if there are at most two years between two years of reforms we treat them also as one event. Our control group is made out of the remaining periods. Within both groups we compute the average change in the participation rate. Finally, the average change in the participation rate of the treatment group is

[19] Since data on participation rates from European LFS Statistics are not available for all years for all countries the panel is unbalanced.

compared with average participation rate for the control group. If a reform is successful, the difference between the participation rates of the two groups should differ from zero.

One way to detect this is to compare the change in the participation rate 1, 2 and 3 years after a pension reform has been implemented with the change in the participation rate in all periods but those that followed a reform. The change in the participation is modelled as follows: $\Delta PR_{i,t} = \alpha I_{i,t} + v_{i,t}$; I_{it} equals 1 if country i enacts a reform in period t and zero otherwise. A similar expression holds for a country j with j≠i. The average change of the participation rate in reforming years relative to change of the participation rate in years of non reform can be written as follows $\frac{\sum_{t}^{T}\sum_{i}^{I}\Delta PR_{i,t}}{IT} - \frac{\sum_{s}^{S}\sum_{j}^{J}\Delta PR_{j,s}}{JS} = \alpha$. The reform in country i is successful if α is statistically different from zero. We evaluate the effect of pension reforms comparing the average change in the participation rate after a pension reform with the average change of the participation rate over the sample period excluding those years where a reform occurred.[20]

For each target group, the first two columns of Table 1 to Table 3, report the average change in the participation rate over reforms and non-reforms years; the statistical significance of their difference appears in column 3[21]. Table 1 suggests that compared to the non-reform years the participation rate of the 50-54 and 60-64 age groups rise significantly in the years near to the reform year. Conversely, no significant change is detected for the participation of those belonging to the 55-59 age group. While fundamental reforms do not have significant effect on the participation rates in the years just following the enactment of the reform, probably because of the gradual phasing-in (table 2), parametric reforms entail a change in the participation rate of those with age between 55 and 59.

[20] In contrast, we do not look at the effect on the participation rate of changes in one specific element of the system (i.e. contributions, eligibility conditions, retirement age, indexation formula, and the like). We leave this for future work.

[21] Since it may take some time for a pension reform to have visible effects on the participation rate, we calculated the average change in the participation rate over a period of 6 years following a pension reform.

Table 1 - Average annual change of the participation rate after EARLY RETIREMENT reforms' years and years where no reforms occur

	No reforms' years	Reforms' years	z-test: same mean changes
Participation rate 50-54	0.5	0.9	**1.9**
Participation rate 55-59	0.7	0.9	0.6
Participation rate 60-64	0.3	0.9	**2.4**
Source: Authors calculations on LABREF database; the difference between the participation rates of the no-reforms and reforms years is statistically different from zero at 5% of confidence when the value of the z-test is above 2			

Source: Commission services.

Table 2 - Average annual change of the participation rate after FUNDAMENTAL reforms' years and years where no reforms occur

	No reforms' years	Reforms' years	z-test: same mean changes
Participation rate 50-54	0.8	0.5	-1.4
Participation rate 55-59	0.7	0.9	0.4
Participation rate 60-64	0.3	0.6	1.1
Source: Authors calculations on LABREF database; the difference between the participation rates of the no-reforms and reforms years is statistically different from zero at 5% of confidence when the value of the z-test is above 2			

Source: Commission services.

Table 3 - Average annual change of the participation rate after NON-FUNDAMENTAL reforms' years and years where no reforms occur

	No reforms' years	Reforms' years	z-test: same mean changes
Participation rate 50-54	0.6	0.5	-0.4
Participation rate 55-59	0.4	1.1	2.1
Participation rate 60-64	0.2	0.5	1.2
Source: Authors calculations on LABREF database; the difference between the participation rates of the no-reforms and reforms years is statistically different from zero at 5% of confidence when the value of the z-test is above 2			

Source: Commission services.

Graph 4 shows the time pattern of the participation rate around the reform event for the three reforms' types and the three age groups. We consider only those reforms that are followed at least by one year; hence, measures taken in 2006 are excluded from the sample. Next, in order to select the reform years we treat two consecutive periods of reform as a one reform year. The same rule applies for years once there are at most two years between two years of reforms. Consequently, the participation rate in the selected years is calculated as a simple average in these years.

The figure plots the average change in the participation rate compared with the year in which the reform occurred. Hence, each point represents the cumulated change up to and since the enactment of the reform. A successful reform implies a change in the slope in the years that follow. Before the pension reform, all groups have participation rates lower than or as big as the rate observed in the year when it is enacted. Then the participation rate increases, and after 3 years it is on average 5 percentage points higher than at the year of enactment.

Graph 4 shows the cumulated change of the participation rates before and after the enactment of early retirement, fundamental and non-fundamental reforms.[22] The following points are noticeable:

- The increase in the participation rate is mainly due to the female component, with increases dominated by a long-term trend.

- After early retirement reforms, the participation rate of women aged 55-59 slightly accelerates, while the profile of the men rate is more muted.

- The change in the participation rates of the oldest group barely differ by gender.

- The 50-59 male participation rate changes after early retirement reforms.

- Non-fundamental reforms modifies the 55-59 participation rate

- The profile of participation rates does not change when fundamental reforms are enacted, which is consistent with these reforms being usually gradually phased in.

- The profile of female participation rate does not change in response to any type of reform. Yet, we don't consider this an evidence of their ineffectiveness as female participation is dominated by a long-term trend unrelated to reforms of social security.

These findings are suggestive of a positive impact of early retirement reforms on the participation rate of specific groups of older workers. The different response for the male and female rates is consistent with differences in the elasticity of the labour supply to the implicit tax rates and in the length of working careers and years of contribution to social security. Thus, tightening the access to early retirement would induce women to postpone retirement.

[22] We consider only those reforms that are followed at least by one year; hence, measures taken in 2006 are excluded from the sample. In addition, when one reform is followed within four years by another reform of the same type, we consider in the calculation only the three years preceding and following the first reform.

Of course, participation rates also change in response to the business cycle. In line with the cyclical ups and downs, those out of the labour force may be induced to starts searching actively for a job when they perceive that their employment chances have improved. Similarly, unemployed people may stop searching for a job when their employment prospects weaken and leave the labour force (the so-called discouraged worker effect). Thus, controlling for the state of the economy is necessary to identify the effects of pension reforms on the participation rate. Finally, the participation behaviour is influenced by changes in the socio-economic aptitudes towards work of the elderly, not necessarily related to governments' interventions. The fact that participation rates can be influenced by other factors invites shifting to multivariate analysis.

Before proceeding with the analysis an important caveat is needed. Short-term changes in the participation following a pension reform, as the one considered in this paper, tell nothing about the lags needed for a reform to fully influence the retirement decision and the participation rate. Pension reforms, especially fundamental, are gradually phased-in and their impact may become visible only after some years, when an increasing number of cohorts born over successive years start to be under the new regime. Therefore, the expected gains of pension reforms cannot always be perceived immediately and their short-run effect is uncertain. Moreover, due to the gradual phase in, it is unlikely that the oldest generations would change their retirement behaviour because of the reform. In contrast, those aged between 50 and 54 are more likely to revise their inter-temporal consumption/leisure allocation. In general, when a reform is announced, agents may respond with "imperfect" foresight when two dimensions of uncertainty, namely the timing and the measures adopted to reform the system, prevail (Butler 1999). Finally, early retirement and non-fundamental reforms may have shorter implementation lags, and their effects can be more visible in the short-term. However, delay between announcement and enactment creates in general the possibility for agents to reassess how the reform will affect their incentive to retire prior to the effective implementation of the new regime (Santoro, 2006).[23] Thus, the effects of the reforms in the short-term are highly uncertain and depend on how different cohorts react to current or perspective changes in the rules of the social security system. For example, for those relatively far from the statutory retirement age, any change in their participation rate due to the reform would be induced by an announcement effect.

[23] Santoro finds unintended announcements effect of the Italian pension reform of September 1992. Santoro, M., M., (2006), "Early announcements of a public pension reform in Italy" CBO WP-1

Econometric Methodology

To capture the effect of reforms we estimate a reduced form regression for the participation rate

$$PR_{it} = \alpha_i + \mu_t + \theta_1 trend_{it} + \theta_2 trend_{it} \cdot SEX_i + \beta_1 FUN_{it} + \gamma_1 NONFUN_{it} + \delta_1 ER_{it} + \beta_2 FUN_{it} \cdot SEX_i + \gamma_2 NONFUN_{it} \cdot SEX_i + \delta_2 ER_{it} \cdot SEX_i + \varepsilon_{it}$$

where PR_{it} is the participation rate for different age groups in country i at time t; α_i and μ_t are fixed effects for countries and years respectively, SEX_i is a dummy equal to 1 for women and 0 for men; ER_{it}, FUN_{it} and $NONFUN_{it}$ are dummy variables taking the value 1 if a reform occurs in country s at time t and zero otherwise. γ, δ and η is the mean difference between countries that undertook a reform of one of the three types and those that didn't. In practice we compare the participation rate in countries enacting a pension reform in a given year with the participation rate in countries that did not enact a pension reform controlling for other (non-reforms factors) that may influence participation. The unemployment rate u_{st} captures the cyclical components of unemployment while long-term changes are represented by country/gender specific trends. [24]

The reference group in the equation is men. Thus α_i represents the average (over time) activity rate of male in country i. Since a reform may imply different effects on the implicit tax rate and pension wealth of groups with different working histories, we expect a response that differs across age groups and gender. The interaction between SEX and the reforms dummies would capture this differential effect. Including interaction of this sort is also convenient when treated and control group are very similar and/or the treatment and the control group differ along other dimension of the data, in our case sex; it may also remove trends along these dimensions (Meyer, 1995). To account for lagged effect of enacted reforms we introduced the reform dummies up to 3 lags (i.e. 3 years).

The use of fixed effects allows controlling for unobserved heterogeneity possibly correlated with the policy dummies. This happens when the participation rates and the decision to undertake reforms of any type are correlated. Under these circumstances the fixed effect estimator is consistent and unbiased. In addition to a country specific unobserved component, there can be a

common latent factor which influences both the participation rate and the reform dummy. This happens when exogenous trends in participation rates (e.g. increase in level of education or female participation) make a reform of the pension system more likely (for example, because there is stronger support for reforming the pension system when the participation rate is low rather than high). In this case the fixed effect estimator is inconsistent and inefficient (Coakley, Fuertes and Smith, 2004). Conversely, the two-way fixed effects provide consistent and efficient estimates. In our case, the inclusion of period dummies would absorb all the values of the coefficients of the reform dummy making them not significant. To avoid this we account for unobserved common factors with a time trend, which is equivalent to controlling for period effects when the coefficient of the trend variable is the same across countries.

The introduction of lagged of the reform dummies control for possible correlation between these and the country specific effects. Finally, to control for the presence of common shocks hitting men and women in each country we correct standard errors using a robust covariance estimator according to the formula developed by Liang and Feger (1986)[25] across groups. We estimate the equation controlling for fixed effects and for fixed and time dummies[26].

Results

Before commenting the results, a note of caution is needed for the relatively limited number of observations and reforms events. Moreover, it is worth reminding that our analysis focuses only on the short-term impact of pension reforms, while in many countries these reforms are phased in only gradually.

The results highlight a different response of the participation rate across gender, age and country groupings (table 6). Columns 1 and 2 show, respectively for the EU27 and the EMU, the

[24] We tried specifications with different combinations of common and country specific trends. In light of the strong institutional characteristics of European labour markets we preferred to include country and gender/ specific trends Results are available from the authors.

[25] This is implemented in Stata with the cluster command. The clustering adjusts for correlations between the error terms over subgroups. In practice there are less independent observations standard errors should go up. If the error terms are not independent in a subgroup of observations (such as for the different time periods for a specific individual in a panel, or e.g. for observations that are spatially close) clustering avoids that common group errors generate too low standard errors (Moulton, 1990)

[26] Controlling for period fixed effects would imply that the estimated coefficients would capture all the effects of our reform dummies which are slowly time varying. Preliminary evidence based on ANOVA F-test suggests that for early retirement and non fundamental reforms there is more similarity in the number of reforms across time averages than across countries averages. The opposite occurs for the number of fundamental reforms with an average which is more similar across time than countries. This implies that the former types of reforms are enacted in a specific cluster of countries uniformly over time. Conversely the latter are enacted in specific years in a large set of member states

estimates of the effects of pension reforms pooling data over the age dimension. The results for the full sample show an increase in the EU27 participation rate following a fundamental reform, though the coefficients are not statistically significant. Similar results are obtained for the male rate when estimates are limited to EMU countries; conversely, the effect on women is negatively signed, though statistically insignificant. In the case of non-fundamental reforms we have similar results for the EU27, i.e. positive but insignificant. In contrast, the estimates for the EMU countries suggest that non-fundamental reforms increase the overall male rate, while the effect on female participation is ambiguous. Finally, reforms tightening the access to early retirement increase female participation, more in the EMU than in the non-EMU countries. Conversely, their effect on male participation is in EMU and non-EMU countries negative or insignificant.

Columns 3 to 7 display the outcome for three age groups. For early retirement reforms, we find a consistent pattern across different age groups of women. Reforms tightening the generosity of the early retirement schemes tend to increase the female participation rates, with statistically significant coefficients, especially for the ages close to the statutory retirement (55-59).[27] By contrast, the participation rate of men aged 50 to 59 is negatively affected by these reforms. Only in the case of men belonging to the 60-64 age bracket of the EMU sample, participation increases after early retirement reforms. In case of reforms that change the main financing characteristics of the pension system (fundamental reforms), we found a short-term negative impact on female participation rates in particular for the 55-59 and 60-64 age groups. In the case of men, the estimates suggest a positive response, in particular for those belonging to the 55-59 bracket. Those reforms that we have dubbed as non-fundamentals appear to be effective in raising the participation rate of men both in the EMU and non-EMU, though the coefficients are significant only for the EMU sample. On the contrary, women participation seems to fall in the short-term. However, the uncertainty associated to these results is higher probably due to "non-fundamental reforms" category being a residual gathering a range of diverse measures. Thus, the implicit assumption that these different measures have the same impact on the participation rate might not be valid. Finally, the impact of the early retirement reforms on women is in absolute terms always the largest. While for men, fundamental reforms seem to have the largest effect on the participation rate for the central age bracket.

One problem with these estimates is that shocks to the participation rate might also hit the variable used to capture its cyclical component, i.e. the unemployment rate, implying that the coefficients measuring its impact on participation are biased downward - as the correlation

[27] The impact is larger in the EMU sample.

between the shock and the unemployment rate is negative - and inconsistent. To correct for this endogeneity, the equation has been re-estimated with instrumental variables using the own lagged values of the unemployment rate as instruments (table 7). As expected, the IV estimates of the coefficients of the unemployment rate are lower than the OLS estimates. Different specifications across countries and age groups suggest that the participation rate is broadly more sensitive to the unemployment in non-EMU countries. One exception is the participation rate of the group 50-54, which has a response to the difficulty of finding a job due to the cyclical conditions as big as in the rest of the EU.

Turning to the role of reforms, the IV estimation suggests for both the EU27 and the EMU sample, a statistically significant and positive effect of fundamental reforms on the overall male and female participation rates (col 1). When the focus is on specific age groups the effect on the male and female participation rates are respectively positive and negative. For the EU27 sample, non-fundamental reforms have usually a positive effect on participation rate, which is, however, precisely estimated only in the case of women. Conversely, for the EMU countries non-fundamental reforms increase the male participation rate but decrease that of women of age between 55 and 59. Finally, reforms of early retirement reduce the participation rate of men, especially those aged between 50 and 54, but increase sizeably that of women.

To account for persistent trends in participation rates unrelated to pension reforms, we include gender and country specific time trends in table 8. Adding trends usually turns out in a lower impact of reforms, implying that in the specification without trend the impact of reforms is biased upward, as part of these trends get caught in the reform dummies. Moreover, the fact the standard error of the coefficients measuring the impact of reforms remained unchanged suggests that the introduction of specific trends does not introduce multicollinearity that reduces the precision of the estimates.

Thus, when we control for gender and country specific trends, we find that

- fundamental reforms increase the participation rate of older men, respectively in the EU and the EMU sample, by about 2/3 of and ½ percentage point within 2 years. For both samples, the response of the male participation rate to fundamental reforms conditioned to age is hump-shaped: low for the youngest and the oldest of the older workers age group and high for those with age at about the average retirement age; participation rates of men aged between 55 and 59 raise by about 2pp. Conversely, female participation

declines in the short-term, more in EMU than in non-EMU countries, offsetting the overall effect of fundamental reforms.

- For the EU sample, non-fundamental increase the overall female participation rate (+0.7pp in the year of reform), especially of women aged between 50 and 54, while the male rates remain mainly unaffected. The opposite is found when the estimates are restricted to the EU subsample. In this case, the male rate increase – again the 50-54 age group being the more reactive – while the female components remain mainly unchanged with the exception of women of age between 55 and 59 whose participation rate drops by more than 2.5pp.

- Early retirement reforms have a positive effect on the female participation rate, especially for the 55-59 age group of the EMU sample. Conversely, in respectively the EU and the EMU samples, the male participation rate drops or remains mainly unchanged.

7. Conclusion and policy implication

This paper investigates the short-term effects of pension reforms on the participation rates of specific age groups belonging to the 50-64 age class with a diff-in-diff approach. Variation across countries and time in pension reforms enacted in the member states provides the information needed to examine the effects of these reforms.

The descriptive and preliminary econometric analysis conducted on a sample of 27 EU countries suggests a different short-term impact of pension reforms on the participation rate of men and women. Reforms tightening the access to early retirement have a short-term positive effect on the female participation rate, but reduce somewhat male participation. In our view, these findings reflect the different length of working life of men and women. A full pension is usually granted to anyone who has been working for a certain number of years. If someone does not reach the statutory number of working years, his or her pension is consequently reduced. When men enter the labour market, they tend to have more stable career path than women and to work continuously until retirement age (e.g. Hall, 1982). By the official retirement age, males have worked a sufficient numbers of years to get a full pension. As long as the pension reform reduces the expected lifetime income, it creates an incentive for those that have accumulated enough financial wealth to retire earlier. Thus, the optimal retirement age is defined as the upper threshold such that is never optimal to retire after that age as lifetime income is downward sloping (B.Jc.Heijdra and Romp, W.E., 2007). Following the announcement of a reform that

makes less generous the pension system, men just below the retirement age may find more convenient to anticipate the exit decision, not to miss a generous pension. These findings suggest the risk of a run on pension funds well before the changes take effect. This has been indeed the case following the announcements of restrictions of early retirement in some EU Member States, according to the 2009 Commission working document "Joint Report on Social Protection and Social inclusion".

Conversely, women have more career interruptions than men, especially because of maternity leave and family reasons, and the number of years spent working at the age of retirement is smaller than men. This difference may explain why the female participation rate raises in response to early retirement reforms. Compared to men, women have to reach a reasonable pension or accumulate a sufficient amount of precautionary savings before being able to retire with (not too large) drop in consumption. The effects are stronger in the EMU than in the non-EMU countries.

The results for non-fundamental reforms are more uncertain. The positive effect of non-fundamental reforms for men is not surprising. These reforms usually adjust upwards the contribution rates, implying a lower net wage. If the substitution effect prevails, an individual prefers to work more. There is an additional motive for working more, which is related to the increasing life expectancy. Because of a longer life span an individual needs to work more in order to accumulate sufficient amount of wealth. As the real wage drops, he/ she needs to work more to reach an intended level of consumption during the retirement age.

In contrast, reforms that change the way of financing pensions or the eligibility conditions (fundamental reforms), usually with long phasing-in periods, may have unintended short-run effect on the female participation rate, especially of EMU countries.

Our findings point at the importance of designing pension reforms and strategies to reform social security that reduce the risks of undesired effects on the decision to remain into the labour market. There is plenty of evidence that workers' information about pension rules and uncertainties about long transition periods may influence in the short-term the retirement decision in a way which is not consistent with the intended effects of the reform. While transitory periods may be needed to gain the political support for the reforms, long and reiterated discussions on how to reform the social security system may add uncertainty and, if allowed by the rule in force, lead to anticipate the retirement decision even in cases where reforms involve future and not current older workers. Well-informed individuals are far more responsive to

pension incentives, while ill-informed individuals seem to respond systematically to their misperceptions of pension incentives (Chan and Huff Stevens, 2008).

To buttress these results, we plan to extend the empirical analysis in five directions. First, in the regression, we control for the determinants of participation unrelated to reforms with country fixed effects, period dummies or a common trend. The evidence found needs to be corroborated by enlarging the set of controls to observable variables, such as self-employed, age of entry into the labour market, per capita income, share of employee working in the public sector. Second, to get an indication of the short-term effect of pension reforms on the retirement decision our result should be validated by similar finding for probability of withdrawing from the labour market. Third, to better study labour force dynamics in response to pension reforms we need to combine the cross-country policy variation with individual information on the labour market status. To use individual data from older workers' self-reported satisfaction to investigate the effect of pension reforms on their retirement decisions. Finally, in the estimate we do not take into account that for the retirement decision what matters is not the individual income but the family income. There is evidence for the US of a differential response to policy changes of men from one earner vs two earner households (Gustman, A. and Steinmeier, T, 2008). Extending the analysis to the participation rates of married men and women might provide some hindsight on the different, and sometime puzzling, response of the male and female participation rates to pension that found in our estimates.

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Table 4 - Life expectancy at birth

	Belgium	Bulgaria	Czech	Denmark	Germany	Estonia	Ireland	Greece	Spain	France	Italy
1980	73.3	71.1	70.4	74.7[1]	73.1	70.6[2]	73.3[3]	75.3	75.4	:	75.6
1990	76.2	71.2	71.5	74.9	75.4	69.9	74.8	77.1	77	77	77.2
2006	79.5	72.7	76.8	78.4	79.9	73.1	79.7	79.5	:	81	81[5]

[1] 1986; [2] 1989; [3] 1985; [4] 1985;

	Cyprus	Latvia	Lith.	Luxem.	Hungary	Malta	Netherl.	Austria	Poland	Portugal	Romania
1980	:	:	70.5	74.7[5]	69.1	70.4	76.5[7]	72.7	:	71.5	69.2
1990	:	:	71.5	75.7	69.4	77[6]	77.1	75.8	:	74.1	69.9
2006	80.6	70.9	71.1	79.4	73.5	79.5	80	80.1	75.3	78.9	72.6

[5] 1986 ; [6] 1994 ; [7] 1985

	Slovenia	Slovakia	Finland	Sweden	UK
1980	:	70.4	74.5[8]	75.8	:
1990	73.9	71.1	75.1	77.6	:
2006	78.3	74.4	79.6	81	:

[8] 1985

Source: Eurostat.

Table 5 - Average exit age

	1984-1990	1991-1999	2000-2006
BE	58.5	59.6	60.2
DK	65.6	64.6	65.8
DE[1]	61.5	60.8	62.7
GR	62.7	63.4	63.2
ES	63.2	62.3	63.3
FR	59.6	59.3	59.8
IE	63.9	64.7	66.3
IT	60.7	59.8	61.1
LU	62.3	58.9	60.8
NL	60.3	60.7	63.2
AT[2]		58.3	61.4
PT	65.1	66.2	64.5
FI[2]		62.5	62.9
SE[2]		65.4	65.7
UK		62.3	64.3
CY			67.9
CZ[3]		59.4	61.2
EE[3]		65.8	67.6
HU[4]		58.1	61.1
LT[5]		65.2	63.8
LV[5]		61.4	67.1
MT			60.1
PL[3]		59.6	58.7
SK[5]		57.4	59.1
SI[4]		61.1	62.7
BG			63.5
RO[6]		61.5	62.5

Source: Commission services.[1] 1985-1989; [2] 1996-1999; [3] 1998; [4] 1997-1998; [5] 1999; [6] 1998-1999

Table 6 – Number of pension reforms by a type of a reform and by a country group

	Fundamental	Non Fundamental	Early
EU27	56	87	37
EMU	36	55	26
Non EMU	20	32	11

Source: LABREF; FRDB Database

Table 7 – Pension reforms' characteristics

COUNTRY	MODIFYING THE PARAMETERS OF EXISTING DB SCHEMES	INTRODUCING NDC STATUTORY SCHEMES	INTRODUCING A FUNDED TIER IN THE STATUTORY PENSION SCHEME	REFORMING EARLY RETIREMENT	DEVELOPING PRIVATE OCCUPATIONAL OR PERSONAL PENSION PROVISION	OTHER (E.G. TAXATION, CONTRIBUTIONS, PENSION COVERAGE, INDIVIDUALISATION OF PENSION RIGHTS)
BE				x		x
DK	x			x		x
DE	x			x	x	x
GR						x
ES				x	x	x
FR	x			x	x	
IE				x		
IT		x		x	x	x
LU						
NL						x
AT	x			x		x
PT	x			x	x	
FI	x			x		
SE	x	x	x	x		
UK	x			x		x
BG	x					x
CY	x					
CZ	x			x		x
EE			x			
HU	x		x	x		x
LT	x		x			
LV		x	x	x		
MT						x
PL		x	x	x		
RO	x					x
SI	x					
SK	x		x	x		x

Source: *LABREF; FRDB Database*

Table 8 –

	Standard retirement age			Earliest age to access old-age pension
Countries	**Current**	**New established by reform and not yet fully implemented**	**Phasing-in period**	
BE	Men: 65 Women: 64	Women: 65	2009	60 (with minimum 35 years career)
DK	Social Pension: 65 (67 for those who had reached the age of 60 on 1.7.1999) Supplementary pension *(ATP)*: 67	1) Increase of the eligible age for pensions from 65 to 67 2) Increase of the eligible age for the voluntary early retirement scheme from 60 to 62	1) 2024-2027 2) 2019-2022	Supplementary pension *(ATP)*: Persons who reach the age of 60 after 1st July 1999 can retire between 65 and 67
DE	65	67, starting with those born in 1947. For all those born after 1964, the standard retirement age of 67 years shall apply. It will still be possible retire at the age of 65 years without pension reduction if minimum 45 years of compulsory contributions from employment and care and from child-raising periods up to the age of 10 of the child.	2012 to 2029	The age limit of 60 years[28] will be increased in monthly intervals as of 2006. From December 2008 the earliest possible age at which a pension can be claimed will be 63 Under certain circumstances, people will be able to retire after 2029 from the age of 63 but will then have to face a permanent cut in the pension of 0.3% per month of earlier retirement. Long-term unemployed will be obliged to take this early retirement option. The retirement age for disabled people will increase accordingly from the age of 63 to 65 years.
GR	*Persons insured before 1.1.1993*: Men: 65 Women: 60 *Persons insured since 1.1.1993*: Men: 65 Women: 65			*Persons insured before 1.1.1993*: Full pension: no age condition if 37 insurance years; from between 55 and 62 years for men (57 for women) depending on number of insurance years or working days eventually plus other conditions (e.g. mothers with a minor child, arduous and unhealthy work) Reduced pension: From 65 years (men and women) if 3,500 insurance days (transitory regulation until 31.12.2008), • from 53 to 60 years for men (55 years for women) depending on number of insurance years or working days plus other if relevant other conditions (e.g. arduous or unhealthy conditions, mothers with a minor or disabled child) *Persons insured since 1.1.1993*: Full pension: no age condition if 37 insurance years or 11,100 days; from 60 years for men and women if arduous or unhealthy work if 15 years of insurance or 4,500 working days; from 55 years for mothers with a minor or disabled child if 20 years of insurance or 6,000 working days Reduced pension: From between 55 and 60 years (men and women) if 35-15 insurance years or 10,500-4,500 days insured

[28] 63 (or 60 for severely handicapped persons) after 35 years of pension insurance periods; 60 for women born before 1952 after at least 15 years of insurance, if compulsory contributions were paid for more than ten years since the age of 40; 60 for persons born before 1952 after at least 15 years of insurance if they were compulsorily insured for at least 8 in the last 10 years, are unemployed at the commencement of the pension and were unemployed for 52 weeks after completion of the age of 58.5 years or have worked part-time for elder workers for 24 calendar months.

	Standard retirement age			Earliest age to access old-age pension
	Current	**New established by reform and not yet fully implemented**	**Phasing-in period**	
ES	65			60 for those insured according to the system abolished on 1/1/1967); 61 for employees with more than 6 years of service in the company and more than 30 years of contributions. The age of 65 can be reduced for certain groups whose professional activity is arduous, toxic, dangerous or unhealthy
FR	General scheme for employees: 60. Complementary schemes for employees *(ARRCO)* and management staff *(AGIRC)*: 65, with possibility to obtain the pension at the age of 60 if the basic pension was accorded at a full rate.			56 for those that started their professional activity at the age of 14 depending on the duration of insurance and contributions 55 for the insured with severe disability who fulfils the minimum periods of insurance and contribution 55 for the complementary schemes for employees *(ARRCO)* and management staff *(AGIRC)*
IE	State Pension (Transition): 65 years. State Pension (Contributory): 66 years.			No early pension
IT	Persons insured before 1.1.1996: Men: 65 ; Women: 60 Persons with a disability of at least 80% and blind people: Men: 60; Women: 55. Persons insured since 1.1.1996: Flexible retirement age between 57 and 65 years.			As of 2008, 60 years of age with no less than 35 years of contributions in the case of employees, and 61 for the self-employed; the age limit is to rise by one year from 2010 and by an additional year from 2014, thus reaching 62 and 63 years for the employees and the self-employed, respectively. A further postponement of pension payments is envisaged with respect to the moment in which the requirements are met, there including workers under the contribution-based system. For the period 2008-2015, the possibility to receive a "seniority pension" under the requirements of previous legislation (at least 35 years of contributions and a minimum age of 57 for the employees and 58 for the self-employed) is provided only to women who choose a pension treatment calculated according to the contribution-based method. Early retirement possible up to 5 years before normal retiring age for employees of companies in economic difficulties *(pre-pensionamento)* Special conditions for employees with early start of working life; employees exposed to arduous work; persons benefiting from specific measures to return to the labour market because of a shut-down or reorganisation of the enterprise; and manual workers
LU	65			Between 57 and 60 on condition that 480 months of effective insurance or assimilated periods can be proved
NL	65			62 for both men and women 60 years for heavy workers provided that they have worked heavily at least 10 years during the preceding 20 years, and have a total of 45 insurance years
AT	Men: 65 Women: 60	Progressive increase of retirement age to 65 for women Elimination of early retirement by 2017	Between 2024 and 2033	Gradual increase of these age limits between 2004 and 2014 (gradual abolition of these types of early pension) plus life coefficient for persons having completed the age of 50 on 1/1/2005 and younger persons Two more types of early pension for those having an extremely long insurance career or particularly hard working conditions

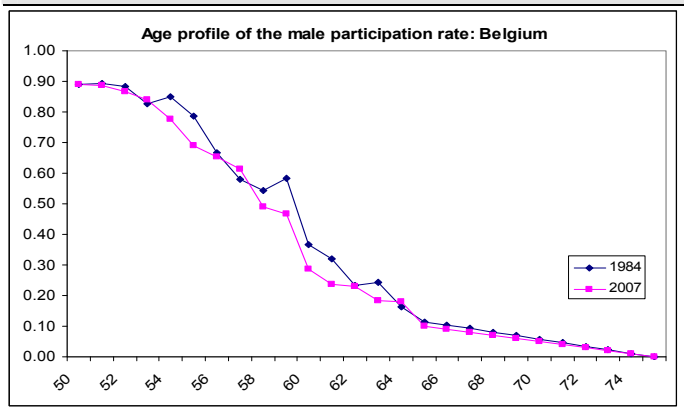
	Standard retirement age			Earliest age to access old-age pension
	Current	**New established by reform and not yet fully implemented**	**Phasing-in period**	
PT	65			Unemployed: 62 if they were aged 57 at the beginning of their unemployment and have completed the qualifying period; 57 for those who have contributed 22 calendar years and are aged 52 or more when unemployed (with reduced pension); 55 in case of heavy or unhealthy work
FI	National pension: 65 Statutory earnings-related pension: between 63 to 68 Lower individual retirement ages in the public sector			62 Statutory earnings-related pension: permanent reduction in the early old-age pension by 0.6% for each month that the pension is taken early National pension: is similarly permanent reduction by 0.4%
SE	Flexible retirement age from 61 to 67			No early pension
UK	State Pension: Men: 65; Women: 60 *First Pillar:* Men: 63 plus 100 points; Women: 59 plus 93 points	Women: 65	2010 to 2020	No early State Pension
BG	If a person has insufficient points the right to a pension shall be acquired after 15 years of insurance and 65 years of age for men and women *Second Pillar:* 5 years before completion of pensionable age provided the amount saved in pensioner's individual account is sufficient to provide a benefit equal to the minimum pension	The age and number of points for women are increased each calendar year by 6 months and 1 point until they reach 60 years and 94 points	2009	1) 47-52 for women and 52-57 for men plus minimum insurance period in the frame of the general statutory scheme with universal coverage. This regime is in force until 2009 2) Teachers pension fund 3) Supplementary compulsory pension insurance under the second pillar for early retirement of persons working under hard labour conditions
CY	65 for men and women; 63 for miners			63 for men and women, provided that the insured person satisfies the relevant contribution conditions and was entitled to invalidity pension immediately before reaching the age of 63 58 for miners with at least 5 years of employment in a mine (1 month early for every period of f5 months of mining work)
CZ	Men: 61 years and 8 months. Women: no children 60 years, 1 child 59 years, 2 children 58 years, 3 or 4 children 57 years, 5 or more children 56 years	The retirement age shall be increased by 2 months for men and 4 months for women each year until it reaches 63 years for men and women without children and 59 – 62 years for women with children		The pension is reduced by 0.9% for every 90 day period before normal retirement age. This reduction is permanent and continues after the recipient reaches normal retirement age

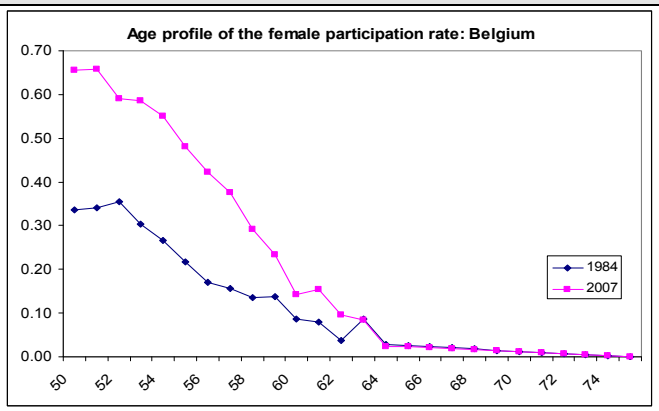
	Standard retirement age			Earliest age to access old-age pension
	Current	New established by reform and not yet fully implemented	Phasing-in period	
EE	Men: 63 Women: 60	Women: 63	2016	Early Retirement Pension: *a*vailable up to 3 years before legal retirement age Old-age Pension Under Favourable Conditions: a) 5 years before standard pension age (after at least 15 years of contributions) for: raising a child with a disability for at least 8 years; raising 5 or more children for at least 8 years; those involved in the clean-up of the Chernobyl nuclear power station; those who have been unlawfully imprisoned or in exile for at least 5 years; b) 3 years before standard pension age for raising 4 children for at least 8 years; c) 1 year earlier for raising 3 children for at least for 8 years; c) 5 or 10 years before the legal retirement age (and 15 to 25 years of contribution) for workers in occupations that are considered hard or hazardous Superannuated Pension: Early retirement available for certain professional groups (e.g. pilots, mariners) whose professional abilities have declined before the normal retirement age, provided they have 15-25 years of pensionable service depending on the profession 2nd pillar: No early pension before retirement age
HU	1st and 2nd pillar: 62			*1st pillar*: Early Retirement Pension to those involved in jobs allowing exemption by age (i.e. work involving increased physical load or hazardous to health): 2 years before normal retirement age for those who have worked in such activities for at least 10 years (men) or 8 years (women); pensionable age is further reduced by 1 year for every additional period of 5 years (men) or 4 years (women). Advanced Pension: from the age of 60 for men and 5 years before the retirement age for women with long service period
LT	Men: 62.5 Women: 60			5 years maximum before retirement age, provided that beneficiaries have an insurance period of 30 years and have been are registered as unemployed for at least 12 months
LV	Men: 62 Women: 61 years by 1 July 2007	Women: gradually increasing by 6 months every year until it reaches 62		2 years before the standard retirement age men and women with an insurance period of not less than 30 years (preretirement pension - until 1st July, 2008)
MT	For persons born before 1/1/1952: Men: 61; Women: 60 (women given the option to retire at 61) For persons born between 1952 and 1955: 62 For persons born between 1956 and 1958: 63 For persons born between 1959 and 1961: 64 For persons born on or after 1/1/1962: 65			*For persons born before 1st January 1952:* No early pension. *For persons born between 1952 to 1961:* 61 if 35 years of paid/credited weekly social security contributions *For persons born on or after 1st January 1962:* 61 if 40 years of paid/credited weekly social security contributions In all cases, those opting for early pension cannot be employed until 65 of age
PL	Men: 65 Women: 60			55 for women with a 30-year qualifying period; 5 years early pension for a) totally incapacitated persons if they fulfil the qualifying period requirements; b) persons working in unhealthy conditions or performing a specific type of work (e.g. journalist, rail workers) 10 years early pension for miners, persons working with lead, cadmium or asbestos, steel workers, pilots, etc. 15 years early pension for wind instrument musicians Persons born since 1.1.1949: No provisions

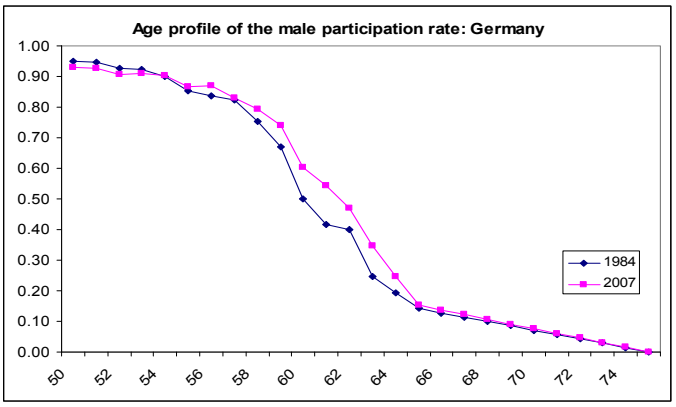
RO	Men: 63 in 1st quarter of 2007 Women: 58 in 1st quarter of 2007	Men: 65 Woman: 60	2014	1) Old-Age Pension with Reduced Standard Retirement Age: assortment of standard retirement age reductions for a) persons who contributed under special or difficult working conditions, b) persons who had a handicap prior to obtaining the insured person status, c) persons persecuted for political reasons, d) women with multiple births, e) other categories, defined by legislation. 2) Early Retirement Pension: maximum 5 years before standard retirement age to insured persons exceeding the full contribution period by minimum 10 years 3) Partial Early Retirement Pension: maximum 5 years before standard retirement age to insured persons exceeding the full contribution period by maximum 10 years
SI	Men: 63 in 2009 Women: 61 in 2008 (following gradual increase)			No special early pension. Possibility of exceptions (no malus) in the case of retirement at the age of 58 provided that a person has completed 40 (men) or 38 (women) years of service
SK	Old-Age Pension: 62	This level of retirement age will be reached in 2014 for all population groups	2014	*1st Pillar:* No age limit. Early pension possible if minimum duration of membership (10 years) and minimum amount of benefit reached. *2nd Pillar:* No age limit. Early pension is possible if the early pension of the 1st pillar is received and minimum amount of benefit reached

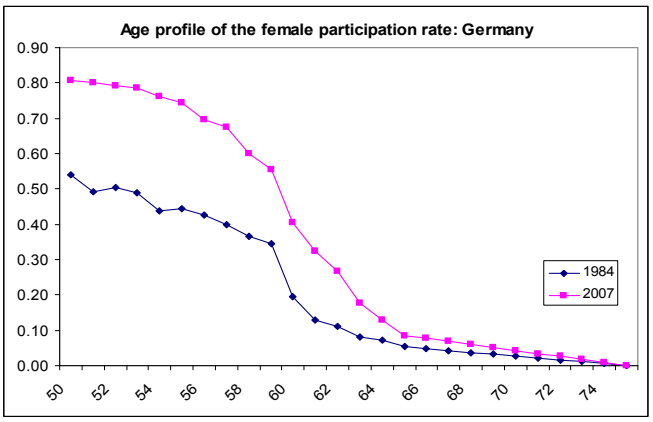
Source: MISSOC Comparative Tables on Social Protection in the 27 Member States of the European Union, in the European Economic Area and in Switzerland, Situation as of 1 January 2007, available at: http://ec.europa.eu/employment_social/spsi/missoc_tables_en.htm#table2007; LABREF 2000-2007.

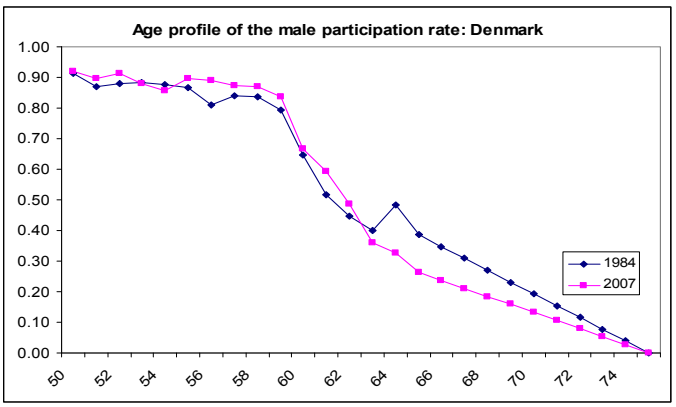
Graph 1 – Male and Female age profiles for selected countries

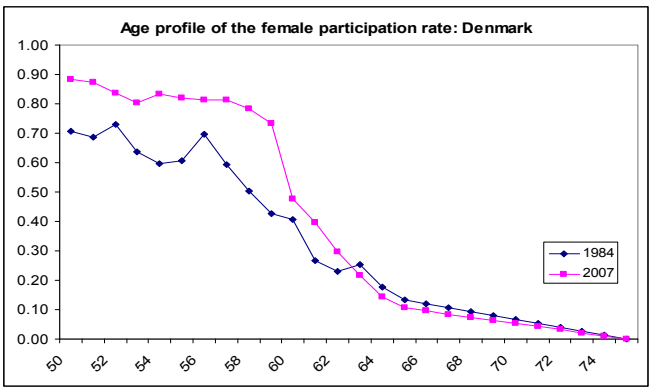






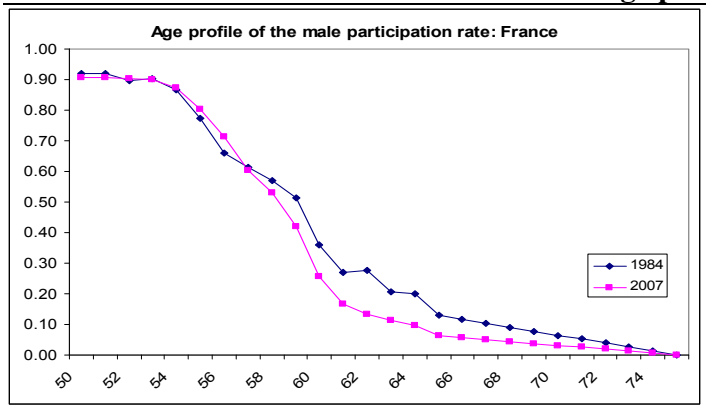


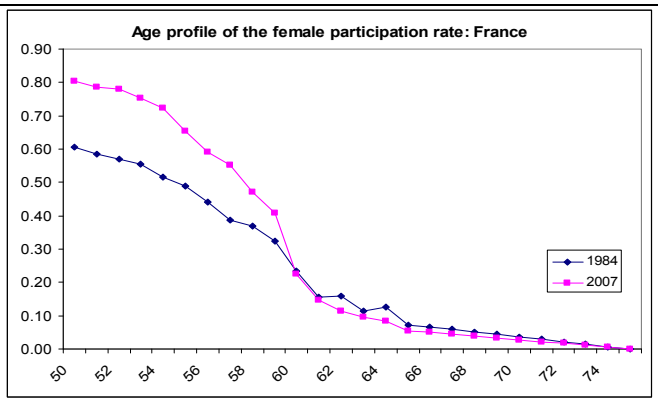


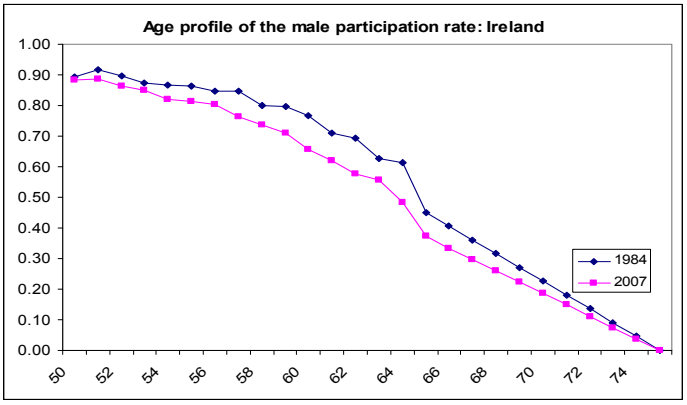


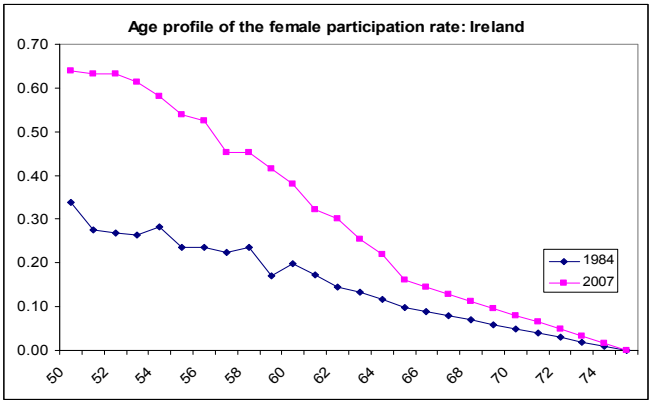
Source: LFS

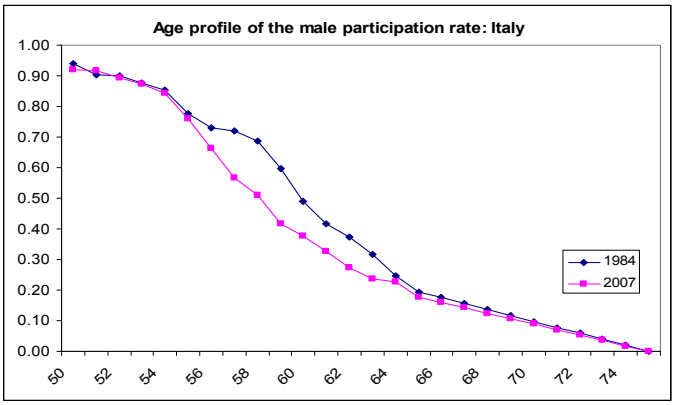
Male and Female age profiles in selected countries

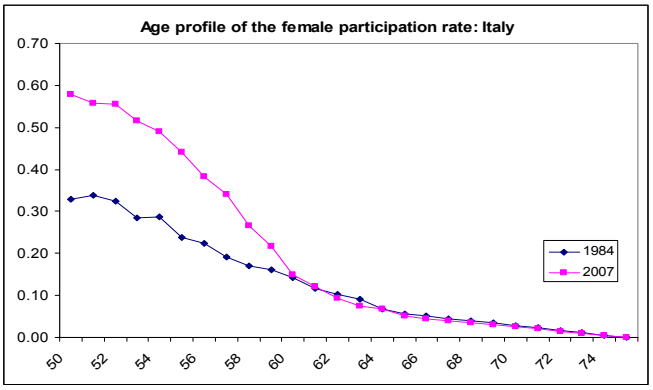






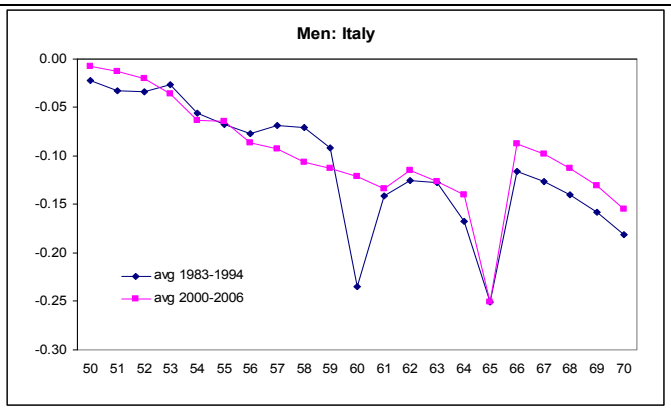


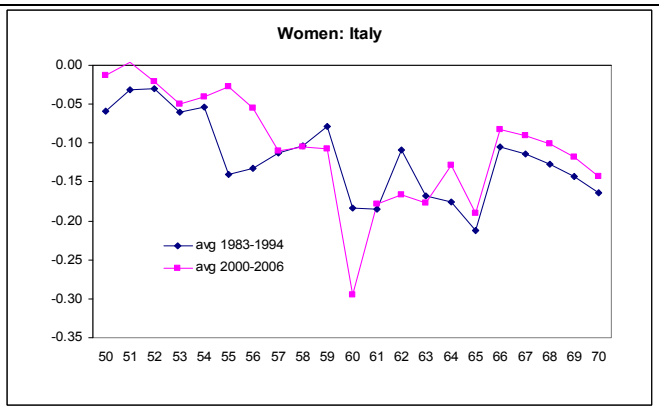


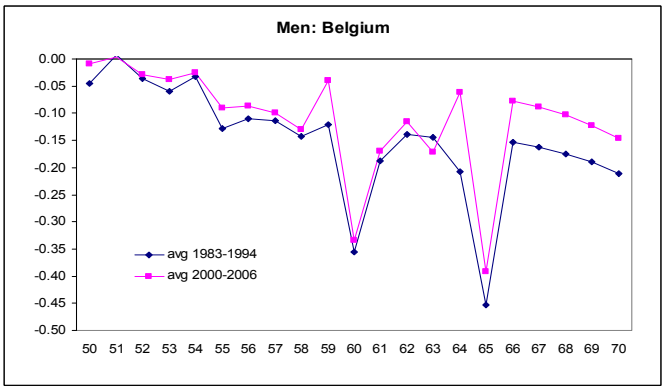


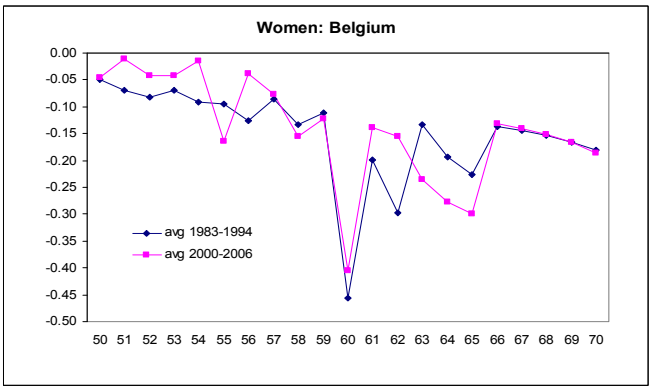
Source: LFS

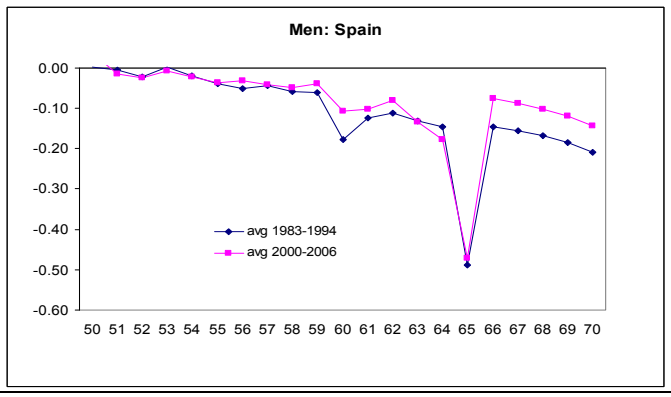
Graph 2 – Probabilities of exiting in selected countries

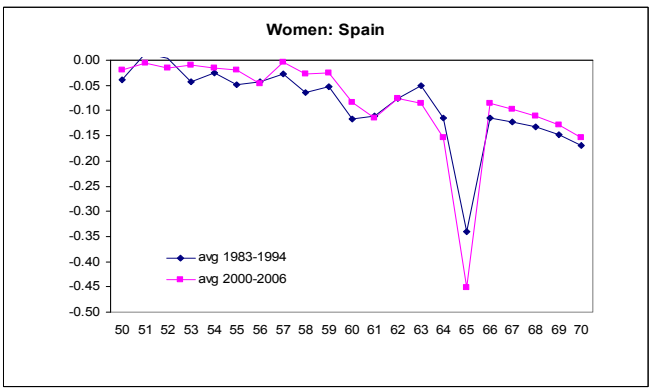

Men: Italy
avg 1983-1994
avg 2000-2006


Women: Italy
avg 1983-1994
avg 2000-2006


Men: Belgium
avg 1983-1994
avg 2000-2006

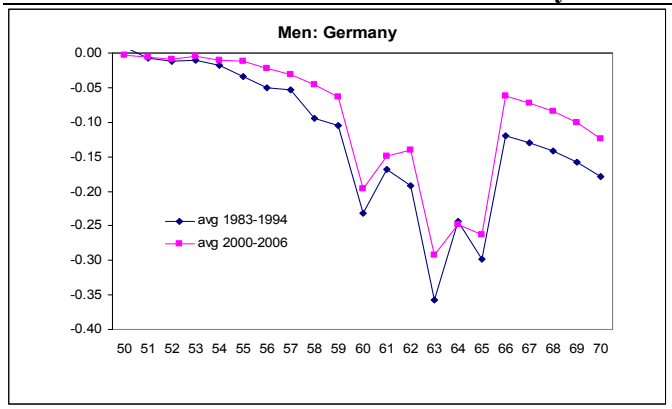

Women: Belgium
avg 1983-1994
avg 2000-2006

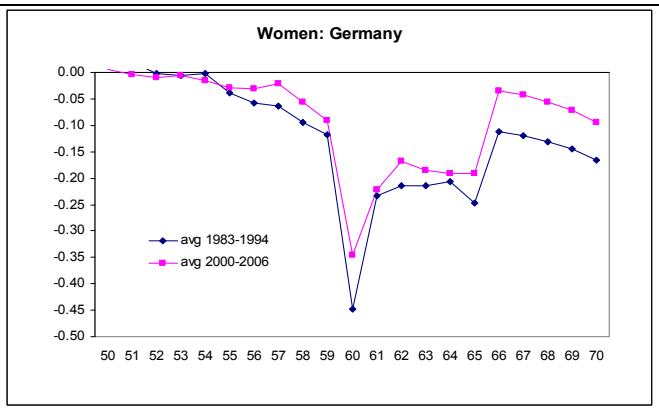

Men: Spain
avg 1983-1994
avg 2000-2006

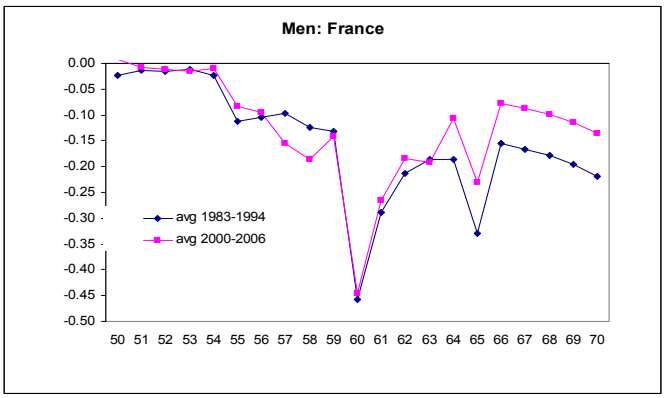

Women: Spain
avg 1983-1994
avg 2000-2006

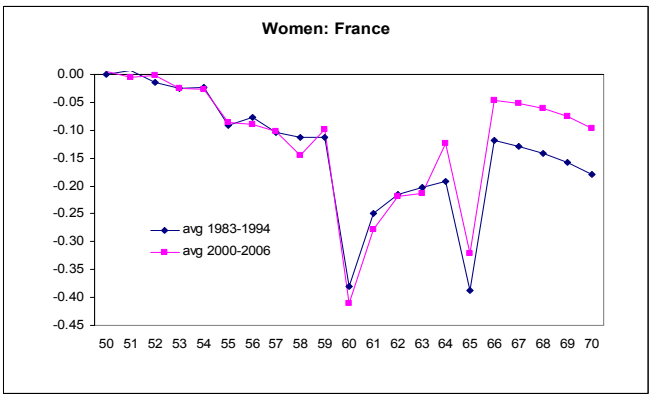
Source: LFS

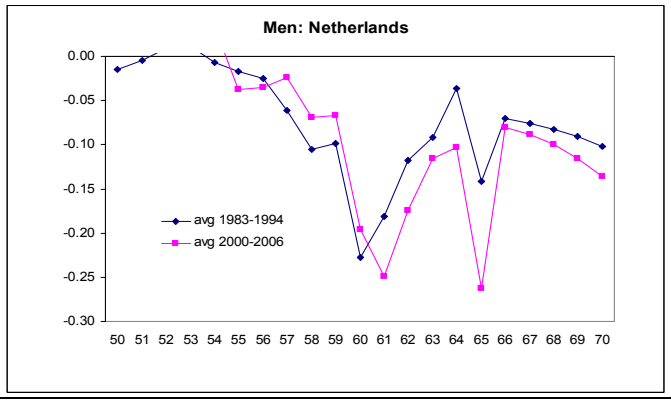
Probability of exiting in selected countries

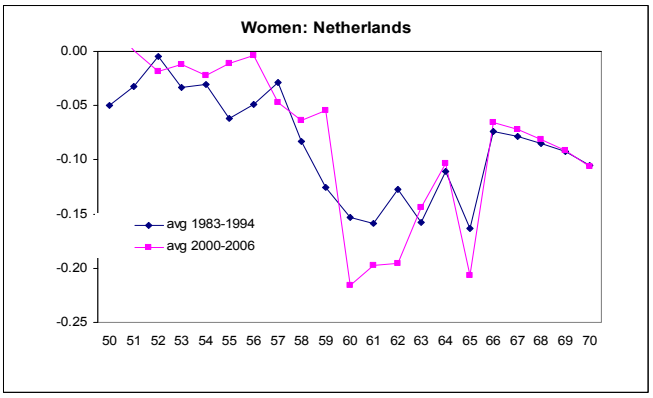






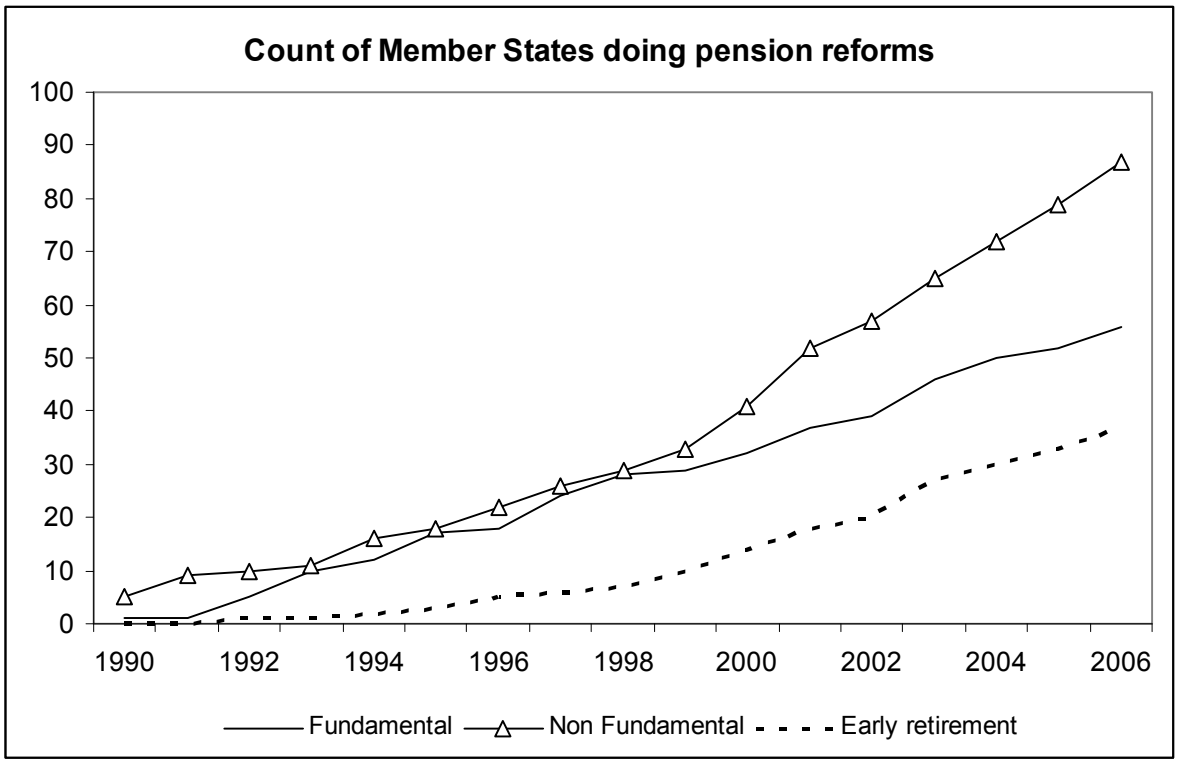






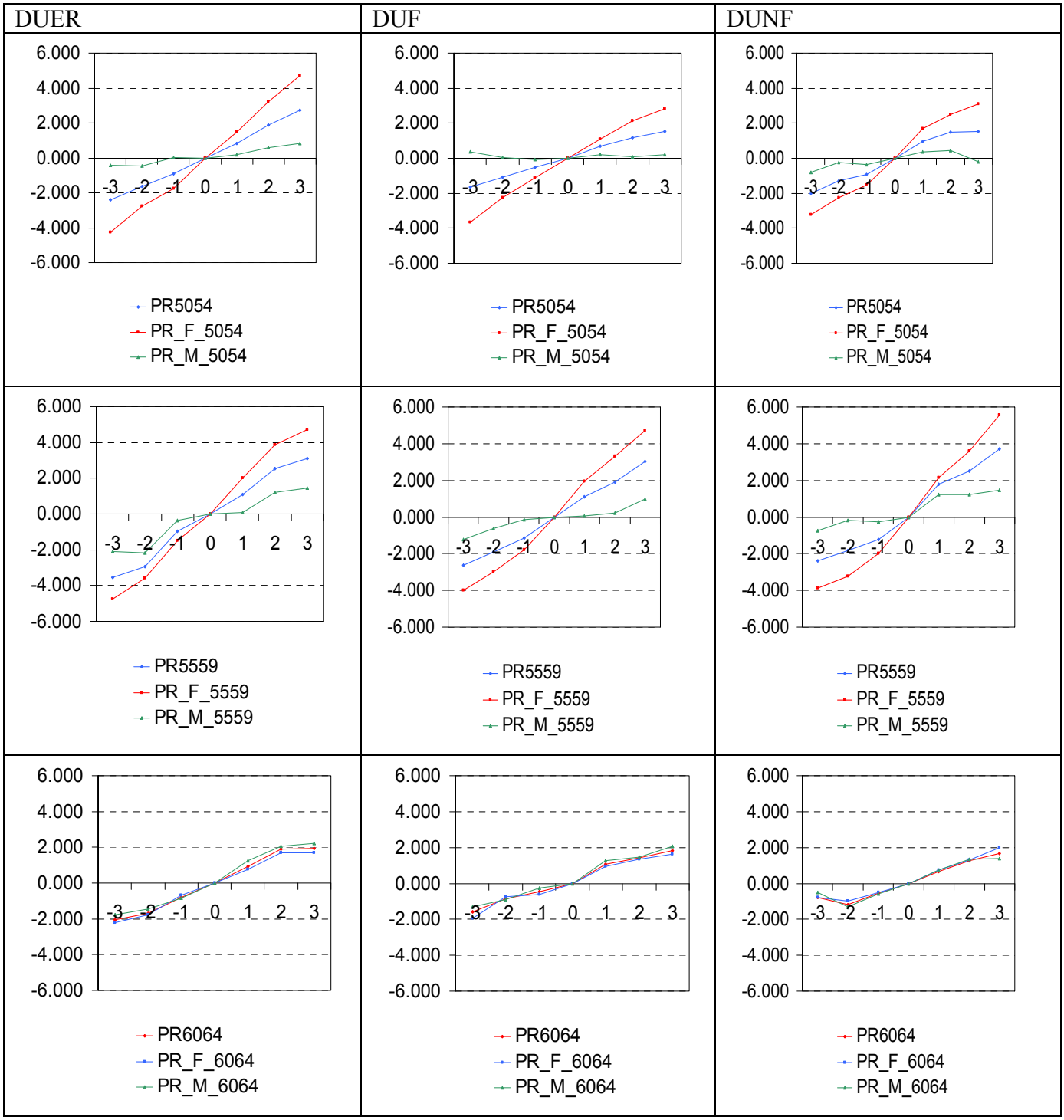
Source: LFS

Graph 3 – Count of Member States doing pension reforms



Source: Commission services. based on FRDB Social reforms data base and LABREF;

Graph 4 - Participation rate before and after reforms of early retirement: EMU countries



Source: Commission services

Table 6

Comparisom of the results between a group of all countries and EMU countries using a prefered spec

Variable	(I)	(I EMU)	II	(II EMU)	III	(III EMU)	(IV)	(IV EMU)
duf	0.1	0.1	-0.4	0.0	1.0	1.3	0.2	-0.4
	0.2	0.2	0.2	0.2	0.4	0.5	0.4	0.4
			**		***	***		
L.duf	0.3	0.2	-0.2	0.4	0.7	0.9	0.7	-0.1
	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.6
					***	***		
L2.duf	0.3	0.5	0.0	0.7	-0.1	0.4	0.9	0.7
	0.3	0.2	0.2	0.3	0.5	0.5	0.6	0.6
		**		***			***	
L3.duf	0.2	0.2	-0.3	0.2	-0.2	-0.1	0.9	0.6
	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.5
							**	
dunf	0.1	0.4	0.0	0.4	0.4	0.5	0.1	0.2
	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.3
		**		**				
L.dunf	0.1	0.3	0.1	0.4	0.5	0.7	-0.1	-0.2
	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.3
		***		**		***		
L2.dunf	0.3	0.2	0.2	0.2	0.2	0.3	0.4	-0.1
	0.2	0.2	0.2	0.2	0.4	0.5	0.4	0.3
L3.dunf	0.1	0.0	-0.3	-0.2	0.3	0.0	0.4	0.1
	0.2	0.1	0.2	0.2	0.3	0.4	0.3	0.3
			**					
duer	-0.4	0.2	-0.5	0.0	0.0	-0.2	-0.7	0.9
	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.3
	**		**				**	***
L.duer	-0.3	0.1	-0.4	-0.2	-0.5	-0.7	0.1	1.2
	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.4
			***		***	***		***
L2.duer	-0.2	0.0	-0.6	-0.4	-0.3	-0.7	0.3	1.2
	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.4
			**			***		***
L3.duer	-0.3	-0.2	-0.6	-0.3	-0.5	-0.9	0.2	0.9
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.4
			**			***		**
duf_Women	0.1	-0.2	0.6	0.5	-1.2	-1.7	-0.9	0.0
	0.3	0.4	0.3	0.4	0.7	0.8	0.5	0.6
			***			**	***	
L.duf_Women	0.1	-0.4	0.1	-0.3	-0.5	-1.8	-1.4	-0.7
	0.4	0.4	0.4	0.5	0.8	0.9	0.6	0.7
						**	**	
L2.duf_Women	0.4	-0.1	-0.1	-0.4	0.3	-0.5	-1.1	-0.6
	0.4	0.4	0.4	0.4	0.9	0.9	0.7	0.8
L3.duf_Women	0.4	-0.1	0.1	-0.3	0.1	-0.2	-1.2	-0.5
	0.3	0.3	0.3	0.4	0.7	0.7	0.6	0.6
							**	
dunf_Women	0.1	-0.3	0.3	-0.3	-0.4	-0.6	-0.6	0.0
	0.3	0.2	0.3	0.3	0.5	0.5	0.5	0.4
L.dunf_Women	0.1	-0.5	0.4	-0.2	-0.8	-1.6	-0.8	-0.6
	0.3	0.3	0.3	0.3	0.7	0.6	0.6	0.5
		***				**		
L2.dunf_Women	0.2	-0.4	0.5	-0.1	-0.3	-1.1	-0.6	-0.2
	0.4	0.3	0.4	0.4	0.8	0.6	0.6	0.5
						***		
L3.dunf_Women	1.0	0.6	0.9	0.1	0.4	0.2	-0.1	0.0
	0.3	0.2	0.4	0.3	0.7	0.6	0.5	0.4
	***	***	**					
duer_Women	1.0	0.9	0.5	-0.4	1.3	2.1	1.6	0.4
	0.3	0.3	0.4	0.4	0.5	0.8	0.5	0.4
	***	***			**	***	***	
L.duer_Women	0.2	0.5	0.2	-0.4	0.7	1.5	0.8	0.5
	0.2	0.3	0.3	0.4	0.5	0.8	0.5	0.5
						***	***	
L2.duer_Women	1.4	1.6	1.2	0.2	2.6	3.2	1.4	1.2
	0.3	0.4	0.4	0.4	0.6	0.9	0.5	0.6
	***	***	***		***	***	***	***
L3.duer_Women	1.3	1.5	0.8	-0.6	3.1	2.7	1.0	0.5
	0.4	0.4	0.4	0.4	0.7	1.0	0.5	0.7
	***	***	**		***	***	***	
u	-0.4	-0.2	-0.2	0.0	-0.5	-0.3	-0.4	-0.3
	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
	***	***	***		***	***	***	***
_cons	50.4	43.5	68.3	59.0	50.7	44.1	27.0	21.7
	0.7	0.8	0.6	0.7	1.4	1.8	1.0	0.9
	***	***	***	***	***	***	***	***
Number of observations	9379.0	5929.0	3756.0	2376.0	2504.0	1584.0	3119.0	1969.0
Number of groups	810.0	480.0	324.0	192.0	216.0	128.0	270.0	160.0
adj R2	0.3	0.4	0.6	0.7	0.4	0.4	0.3	0.3

Table 7

UNEMPLOYMENT instrumented by UNEMPLOYMENT(t-1)

Variable	(I)	(I EMU)	(II)	(II EMU)	(III)	(III EMU)	(IV)	(IV EMU)
u	-0.3	0.0	-0.2	0.0	-0.5	-0.4	-0.4	-0.2
	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
	***		***		***	***	***	***
duf	0.3	0.1	0.1	0.1	1.1	1.1	0.1	-0.5
	0.2	0.3	0.2	0.3	0.4	0.5	0.4	0.4
					**	**		
L.duf	0.3	0.1	0.1	0.3	0.8	0.9	0.3	-0.5
	0.2	0.3	0.2	0.3	0.5	0.6	0.4	0.4
					*			
L2.duf	0.4	0.5	0.3	0.6	0.0	0.5	0.7	0.4
	0.2	0.3	0.2	0.3	0.5	0.6	0.4	0.4
		*		**			*	
L3.duf	0.1	0.2	-0.1	0.2	-0.2	0.0	0.6	0.5
	0.2	0.3	0.2	0.3	0.4	0.5	0.4	0.4
							*	
dunf	0.2	0.4	0.0	0.5	0.1	0.5	0.2	0.3
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
		*		**				
L.dunf	0.1	0.3	0.0	0.5	0.1	0.7	-0.1	-0.2
	0.2	0.2	0.2	0.3	0.4	0.5	0.3	0.4
				*				
L2.dunf	0.3	0.1	0.2	0.3	-0.2	0.3	0.4	-0.2
	0.2	0.2	0.2	0.3	0.4	0.5	0.3	0.4
L3.dunf	0.0	0.0	-0.4	-0.1	-0.2	0.0	0.4	0.2
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
			*					
duer	-0.4	0.2	-0.5	0.0	0.0	0.1	-0.8	0.8
	0.2	0.2	0.3	0.3	0.5	0.5	0.4	0.4
	*		*				**	**
L.duer	-0.4	0.0	-0.4	-0.2	-0.5	-0.4	-0.2	0.9
	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.4
			*					**
L2.duer	-0.3	0.0	-0.6	-0.4	-0.3	-0.5	0.2	1.2
	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.4
			**					***
L3.duer	-0.3	-0.2	-0.4	-0.2	-0.4	-0.7	0.0	0.7
	0.3	0.3	0.3	0.3	0.5	0.6	0.4	0.4
								*
duf_Women	-0.3	-0.1	0.0	0.3	-1.0	-1.7	-0.4	0.4
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.5
						**		
L.duf_Women	-0.3	-0.4	0.0	0.1	-0.3	-1.6	-0.4	0.3
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.6
						**		
L2.duf_Women	-0.2	-0.3	-0.3	-0.3	0.2	-0.9	-0.6	0.0
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.6
L3.duf_Women	0.0	-0.2	0.0	-0.2	0.0	-0.5	-0.7	-0.3
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.5
dunf_Women	0.1	-0.1	0.3	-0.4	0.2	-0.8	-0.6	0.0
	0.3	0.3	0.3	0.4	0.5	0.6	0.4	0.4
L.dunf_Women	0.1	-0.2	0.6	-0.2	-0.2	-1.7	-0.4	-0.3
	0.3	0.3	0.3	0.4	0.5	0.7	0.4	0.5
			**			**		
L2.dunf_Women	0.3	-0.1	0.6	-0.2	0.6	-1.1	-0.3	0.0
	0.3	0.3	0.3	0.4	0.6	0.7	0.5	0.5
			**					
L3.dunf_Women	0.7	0.3	1.0	0.0	0.9	0.0	0.2	0.2
	0.3	0.3	0.3	0.4	0.6	0.7	0.5	0.5
	**		***		*			
duer_Women	0.6	0.2	0.4	-0.3	1.1	1.5	1.5	0.4
	0.3	0.4	0.4	0.4	0.7	0.8	0.5	0.6
	**				*	*	***	
L.duer_Women	0.3	0.3	0.3	-0.1	0.7	1.7	1.0	0.8
	0.3	0.4	0.4	0.4	0.7	0.8	0.5	0.6
						**	*	
L2.duer_Women	0.7	0.5	0.7	0.1	1.7	2.7	1.2	0.9
	0.3	0.4	0.4	0.5	0.7	0.8	0.6	0.6
	**		*		**	***	**	
L3.duer_Women	0.4	0.1	0.1	-0.6	1.6	2.3	1.0	0.6
	0.4	0.4	0.4	0.5	0.7	0.8	0.6	0.6
					**	***		
_cons	47.8	41.0	67.6	59.1	48.1	44.9	25.8	20.8
	0.5	0.5	0.4	0.6	0.9	1.1	0.7	0.7
	***	***	***	***	***	***	***	***
N	8992	5782	3600	2316	2400	1544	2992	1922
N_g	810	480	324	192	216	128	270	160

Table 8

UNEMPLOYMENT instrumented by UNEMPLOYMENT(t-1 and t-2)

Variable	(I)	(I EMU)	(II)	(II EMU)	(III)	(III EMU)	(IV)	(IV EMU)
u	-0.3	0.0	-0.2	0.0	-0.4	-0.5	-0.3	-0.2
	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
	***		***		***	***	***	***
duf	0.4	0.2	0.0	0.0	1.2	1.1	0.2	-0.2
	0.2	0.2	0.2	0.3	0.5	0.5	0.4	0.4
					***	**		
L.duf	0.6	0.3	0.5	0.4	1.0	0.9	0.4	-0.4
	0.2	0.3	0.2	0.3	0.5	0.6	0.4	0.4
	***		*		**			
L2.duf	0.4	0.4	0.2	0.3	0.0	0.5	0.8	0.6
	0.2	0.3	0.2	0.3	0.5	0.6	0.4	0.4
	*	*					**	
L3.duf	0.2	0.2	0.0	0.0	-0.3	0.0	0.7	0.6
	0.2	0.2	0.2	0.3	0.4	0.5	0.4	0.4
							**	*
dunf	0.2	0.4	0.1	0.4	0.2	0.5	0.3	0.4
	0.2	0.2	0.2	0.2	0.4	0.4	0.3	0.3
		*						
L.dunf	0.2	0.3	0.1	0.4	0.3	0.7	0.1	-0.1
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
				*				
L2.dunf	0.3	0.1	0.2	0.2	-0.2	0.3	0.5	-0.1
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
L3.dunf	0.1	-0.1	-0.3	-0.2	-0.2	0.1	0.4	0.1
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
duer	-0.4	0.1	-0.6	-0.3	0.0	0.1	-0.7	0.8
	0.2	0.2	0.3	0.3	0.5	0.5	0.4	0.4
	*		**				*	**
L.duer	-0.4	-0.2	-0.7	-0.6	-0.5	-0.4	-0.2	0.9
	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.4
	**		***	*				**
L2.duer	-0.3	-0.3	-0.7	-0.6	-0.3	-0.4	-0.1	0.9
	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.4
			**	*				**
L3.duer	-0.3	-0.3	-0.5	-0.2	-0.4	-0.6	0.0	0.7
	0.3	0.3	0.3	0.3	0.5	0.6	0.4	0.4
			*					*
duf_Women	-0.1	0.1	0.1	0.6	-1.4	-1.8	-0.5	0.1
	0.3	0.3	0.4	0.4	0.6	0.7	0.5	0.5
					**	**		
L.duf_Women	-0.1	-0.2	-0.3	0.0	-0.5	-1.8	-0.6	0.1
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.5
						**		
L2.duf_Women	0.5	0.6	0.2	0.5	0.7	-0.1	-0.2	0.3
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.6
	*	*						
L3.duf_Women	0.4	0.2	0.0	0.1	0.3	-0.4	-0.8	-0.3
	0.3	0.3	0.3	0.4	0.6	0.7	0.5	0.5
dunf_Women	-0.2	-0.1	0.3	-0.2	0.1	-0.8	-0.6	-0.2
	0.3	0.3	0.3	0.3	0.5	0.6	0.4	0.4
L.dunf_Women	-0.2	-0.3	0.6	-0.1	-0.2	-1.6	-0.5	-0.4
	0.3	0.3	0.3	0.4	0.6	0.7	0.4	0.5
			**			**		
L2.dunf_Women	0.2	0.0	0.8	0.0	0.8	-0.9	-0.2	0.0
	0.3	0.3	0.3	0.4	0.6	0.7	0.4	0.5
			**					
L3.dunf_Women	0.8	0.3	1.0	0.2	1.1	-0.1	0.3	0.3
	0.3	0.3	0.3	0.4	0.6	0.6	0.4	0.4
	***		***		*			
duer_Women	1.1	0.6	0.5	0.1	1.5	1.9	1.5	0.6
	0.3	0.3	0.4	0.4	0.6	0.7	0.5	0.5
	***	*			**	***	***	
L.duer_Women	0.8	0.7	0.5	0.4	1.0	2.1	1.1	0.9
	0.3	0.4	0.4	0.4	0.7	0.8	0.5	0.5
	**	**				***	**	
L2.duer_Women	1.8	1.1	1.0	0.7	2.5	3.6	1.7	1.6
	0.3	0.4	0.4	0.5	0.7	0.8	0.6	0.6
	***	***	***		***	***	***	***
L3.duer_Women	1.3	0.2	0.2	-0.5	1.7	2.4	1.0	0.6
	0.4	0.4	0.4	0.5	0.7	0.8	0.6	0.6
	***				**	***	*	
_cons	48.7	40.2	67.6	60.0	47.2	45.7	24.9	20.4
	0.4	0.6	0.5	0.6	0.9	1.1	0.7	0.7
	***	***	***	***	***	***	***	***
N	8603	5633	3444	2256	2296	1504	2863	1873
N_g	810	480	324	192	216	128	270	160